PRODUCTS finishing

Volume 10 APRIL, 1946 Number 7

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Kindness is money in the bank of life. The man who spends it, be he employer or employee, is richer as a result. In this respect, kindness is akin to a rare word. The more a man uses it, the more firmly does he possess it.

Consider, can you buy a friend for a hundred dollars? Probably not, but take him a quarter's worth of corn out of your garden and he will never forget you.

Opportunities for kindness exist wherever and whenever two people meet. Unfortunately, they are most frequently overlooked in the two places where we spend most of our time. We would be happier at home if we recognized and seized more of those fleeting, golden opportunities for a kind word or action. At the shop or office we would have an easier and infinitely more pleasant time of it if we thought a little less about ourselves and a little more about the other guy.

A boss is loved and respected who considers his employees as his equals in most things, his superiors in others. Conversely, the boss is just as human as anybody else and would get a kick out of being treated that way once in a while.

Kindness is not a difficult thing. It consists merely in saying or doing the things you don't have to say or do.

APRIL, 1946 Vol. 10, No. 7

Stripping and Cleaning Aircraft

By FRED M. BURT

NAVY planes require complete stripping or "de-painting" of their surfaces after long service under corrosive salt air and water conditions in order that they may receive a new protective coating of primer and lacquer. In most cases, this is scheduled to be done every 2,400 hours of service. Army planes are also being stripped of their camouflage enamel so as to be restored to their original, silver-like brightness. This all adds up to a very large, continuous job, and the methods that have been used extensively are so slow that at the Air Technical Service Command base, San Bernardino, California, it has required as many as 284 man-hours to completely strip and clean a B-25 bomber. However, as the result of the recent adoption of new methods and materials (marketed by Cee-Bee Chemical Company, Los Angeles), the average time required to completely strip and clean a B-25 bomber has been reduced to nine hours, with a better quality of work obtained.

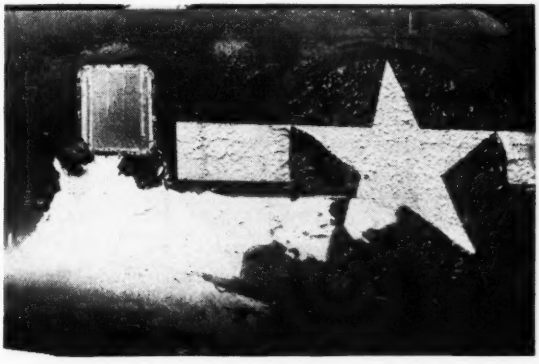
With the old method, the stripping compound was applied with a brush

(Above) Spraying a B-25 bomber with A-21 stripping solution using a Binks pressure tank

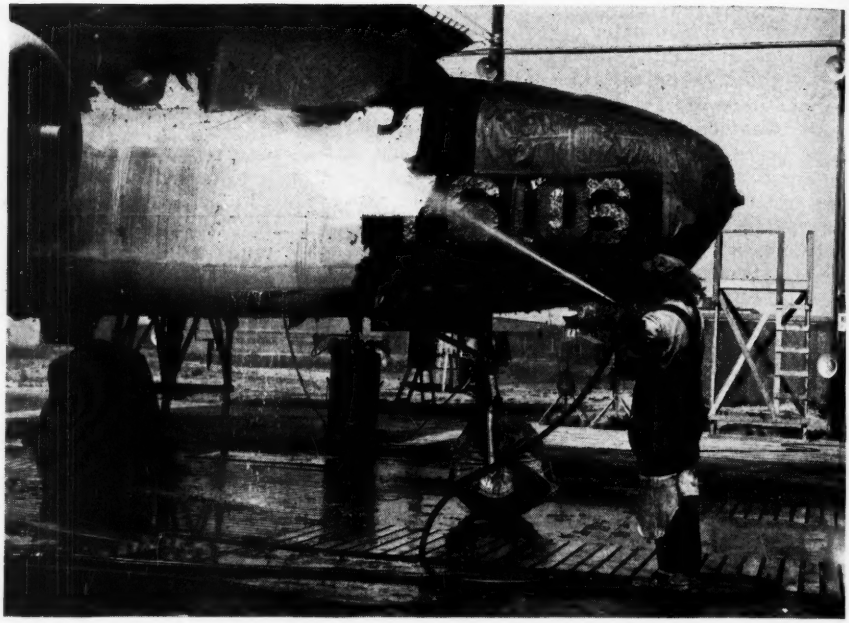
by hand to relatively small areas of the surface. Then, after allowing the stripper to remain on the surfaces for a short period of time so as to permit it to work, the loosened enamel was scrubbed off with rags. In some cases, two operations using two different strippers were required—one for the cover coat and another for the primer coat. After these operations the plane was also given a general cleaning before the job was complete. This spot method required a large crew for rapid work; ladders, scaffolding, or other supports for the workmen to stand on so that they could reach all parts of the plane; and a closeness to the work that made for undesirable working conditions.

With the new technique as used at San Bernardino and other bases, A-21 stripping solvent is simply sprayed all over the plane in order to remove the finish. In preparing the plane for stripping, all fabric surfaces are removed to prevent harm by the solvent; deicer boots are protected or removed; tires are covered; and wooden panels or other means of protection are placed in front of the motors. Metal surfaces are unaffected by the stripping solution. The Plexiglas is coated with Plexi-mask, using a brush. Before its application, the framework around the Plexiglas is covered with Scotch tape which is carefully applied so that the Plexi-mask may be brushed up to the very edges of the glass and no farther. Ten minutes after application of the Plexi-mask the Scotch tape is removed so that all of the framework may receive the stripper spray.

The A-21 stripping solution is contained in a large Binks pressure tank and is fed, for use, into a long hose on the other end of which is a spray nozzle mounted on a pipe holder of the desired length. The operator first applies the stripping solution to the top surfaces of the tail and then works forward on the fuselage, out each wing, and to the nose. Except on very large planes, the lower side and bottom surfaces can be sprayed from the ground. In any event, the stripping solution is sprayed all over the plane. Immediately, it starts to work on the top coat of enamel or lacquer and the primer coat. In most cases, within ten minutes the coatings have wrinkled up and have become thoroughly loosened. The loosened paint is then washed off using a high pressure combination cleaning machine which can be arranged to provide (1) 3 to 3½ gallons of steam per minute at 150 to 200 lb. pressure, (2) 5 to 10 gallons of hot water per minute at 250 to 325 lb. pressure, (4) 3 to 15 gallons of warm water per minute at 300 to 400 lb. pressure (4) 3 to 15 gallons of warm water per minute at low pressure, and (5) high pressure wet steam.



Condition of paint approximately ten minutes after application of the stripper. The small Plexiglas window is coated with Plexi-mask for protection from the stripping solution.

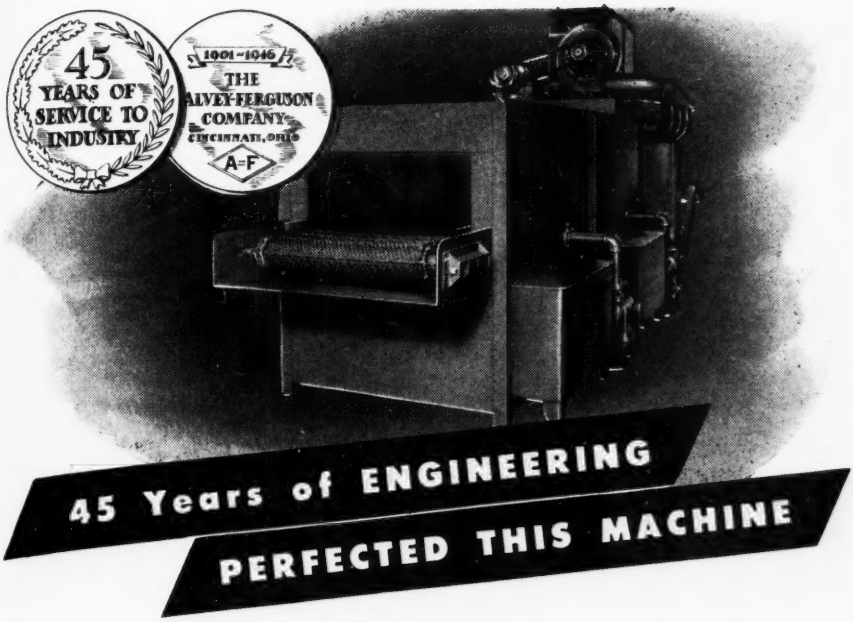


Washing off the wrinkled and loosened paint using A-10-L cleaner and hot water from a high pressure cleaning machine

In performing the cleaning operation on the plane, high pressure hot water is used with A-10-L cleaner which is carried by hose to the high pressure nozzle. The latter can be used at some distance from the work since it is designed to deliver the solution at 140 deg. F. and 8 lb. impinging force to a surface 8 feet away. The solution of A-10-L is regulated at 1 oz. per gallon of water at the nozzle mouth. As the solution strikes the wrinkled and loosened paint, it simply washes it away, providing a completely stripped or depainted surface. A subsequent cold water rinse leaves the surface clean and bright, ready for a new coating if one is scheduled. The protective coating on the Plexiglas can be washed off with warm water.

"Behind the Scenes in a Modern Plating Shop" is the title of a 16-page profusely illustrated booklet published by The Acme Plating Co., 1563 E. 21st St., Cleveland 14, Ohio. As mentioned in the booklet, its purpose is to show that electroplating has its scientific aspects and does not consist merely of dipping parts in and out of tanks. Zinc and cadmium plating operations are treated in this pocket-size booklet, copy of which is available free upon request.

Bristol pH Equipment. The Bristol Co., Waterbury 91, Conn., has issued a bulletin describing its line of continuous pH controllers and recorders, including electrode assemblies and accessories. In addition, the bulletin contains engineering and technical information relative to pH theory and measurement. A variety of actual installations are described, with chart records, photographs, and flow diagrams included. Copy of Bulletin No. pH1302 free upon request.



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The Concluding Section of an Article on the Significance, Measurement Etc., of pH

By BRYANT W. POCOCK

IT is possible through the use of chemical indicators to measure the pH of an unknown solution very accurately or to tell when we have attained the pH we wish. Indicators are for the most part organic compounds of rather complicated make-up which have the remarkable property of suddenly changing color at definite pH values. Some indicators are quite critical, undergoing their optical transformations within narrow ranges of hydrogen ion concentration. Some, like methyl violet and malachite green, have more than one region in the pH scale where this property is useful. A chart can be obtained from the Eastman Kodak Company listing 61 indicators manufactured by that company which cover the entire useful scale. Lange lists the following as being the most important indicators:

Indicator	Color		pH
	Acid	Basic	
Tropeolin 00	Red	Yellow	1.3 — 3.0
Thymol blue	Red	Yellow	1.2 — 2.8
Methyl yellow	Red	Yellow	2.9 — 4.0
Methyl orange	Red	Orange-yellow	3.1 — 4.4
Tetrabromophenol blue	Yellow	Blue	3.0 — 4.6
Bromophenol blue	Yellow	Blue-violet	3.0 — 4.6
Bromocresol green	Yellow	Blue	3.8 — 5.4
Methyl red	Red	Yellow	4.4 — 6.2
Chlorophenol red	Yellow	Red	4.8 — 6.4
Bromophenol red	Yellow	Red	5.4 — 7.0
Bromothymol blue	Yellow	Blue	6.0 — 7.6
Phenol red	Yellow	Red	6.4 — 8.0
Neutral red	Red	Yellow-orange	6.8 — 8.0
m-Cresol purple	Yellow	Purple	7.4 — 9.0
Thymol blue	Yellow	Blue	8.0 — 9.6
Phenolphthalein	Colorless	Red	8.0 — 9.8
Thymolphthalein	Yellow	Blue	9.3 — 10.5
Alizarine yellow	Yellow	Red	10.1 — 12.0

Use of the foregoing or other indicators and attainment of the highest accuracy in pH determinations are facilitated by inexpensive comparator sets such as the Taylor Slide Comparator, the Long Range Slide Comparator, the Dalite Slide Comparator, the Roulette Comparator, the Hellige Comparator, and so on, or the relatively more expensive colorimeter may be used.

A very convenient, simple and rapid method of getting the approximate pH of an unknown solution makes use of the well-known test paper principle. Test papers are impregnated with indicators suitable for various ranges of pH. Perhaps the oldest and best known of all these papers are the familiar red and blue litmus strips. Currently popular are the so-called Hydrion pH papers which cover wide ranges of pH and are equipped with color charts of considerable accuracy. These test papers are furnished in convenient plastic cases and are manufactured by the Micro Essential Laboratory, Brooklyn, N. Y.

BRYANT W. POCOCK

All these colorimetric methods of determining pH have certain limitations incident to the particular technique employed. Most indicators are considerably affected by temperature, and many of them are subject to fading. Although high accuracy may be attained under suitable conditions, many industrial chemists prefer the potentiometric measurement of pH.

Probably the most satisfactory determinations of pH from an industrial standpoint are those made electrically by the aid of so-called pH meters. Two of the most well-known makes of pH meters in this country are the Beckman and the Leeds and Northrup lines, of which several types are available for special purposes. These are potentiometric devices, some of which are designed as continuously recording equipment for maintenance of permanent records at all times. Even automatic control of pH is now in widespread use industrially. These instruments all make use of suitable electrode systems which "detect" the feeble electromotive forces set up by and proportional to the pH of the solution being studied and have in addition potentiometers for measuring these forces. The dials which are read are not usually calibrated in units of E.M.F., but directly in pH units.

Accessories for use with these instruments include electrode systems embracing half a dozen general types of electrodes, each type having its own peculiar characteristics and limitations. Those most generally used include the following:

1. The hydrogen gas electrode. Use of this electrode for continuous measurement of pH on recording equipment is not practical. Precision of measurement is very high however in buffered solutions. Strong oxidizing or reducing agents or ions of metals below hydrogen in the electromotive series or of lead may not be present. Solutions containing dissolved gases, or unbuffered solutions between pH 4 and pH 10 cannot be measured satisfactorily.

2. The quinhydrone electrode. This electrode is quickly prepared and may be used rapidly. Mild oxidizing agents

and pressure changes are without effect on it, and salts of metals below hydrogen in the electromotive series may be present. In general, it should not be used for pH values above 8, although when well buffered, solutions up to pH 9.0 may be estimated. It is adaptable to continuous measurement and control.

3. The calomel electrode. This electrode possesses high conductivity and hence is very sensitive. It is almost universally used as a reference electrode because of its constancy of potential and ease of preparation. It must be properly designed to avoid creep, and extremely pure chemicals should be used in its preparation.

4. The silver chloride electrode. This electrode is somewhat more difficult to prepare than the calomel electrode but is highly reliable, stable, and has the advantage of possessing a small temperature coefficient.

5. The antimony electrode. This electrode is rugged and is suitable for continuous plant service. It is difficult to prepare and its accuracy is less than that of the hydrogen or quinhydrone types, but it is used extensively in certain industrial applications where measurements over long periods of time are of importance. Precision is somewhat less when used with solutions in contact with air.

6. The glass electrode. A measuring instrument of high sensitivity is required with this electrode because of its relatively high electrical resistance. It is quite fragile but is inert to practically all reagents except fluorides. It is the best electrode for unbuffered solutions. Its response is not linear above pH 9.6, a special calibration being required. It does not contaminate the solution being measured. Composition of the glass is critical.

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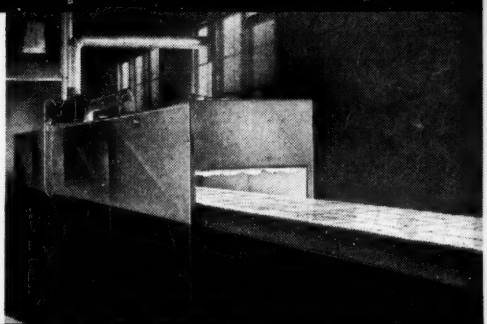

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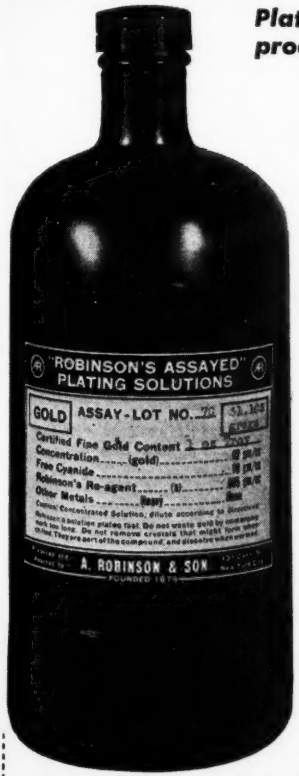

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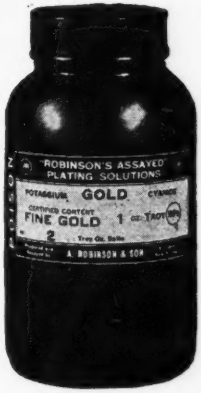

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theory and measurement of pH and on buffers and indicators can be obtained from the appended list of references.

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Soap in Industry. By Georgia Leffingwell and Milton Lesser. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. 204 pages. Cloth binding, board covers. Price, $4.00.

This book affords a practical treatise which is designed to provide chemists, manufacturers, salesmen, industrial workers, and students with many useful hints as to the utilization of soaps in manufacturing processes. In the various industries, many special soap-like products are employed for specific tasks. These products, whose raw materials are fats and oils, are treated separately in detailed discussions of individual industries.

The authors have included a wealth of formulas carefully selected during their many years of experience with industrial soaps and their application. Attention is called to the distinctive qualities of the various formulas, the methods of their preparation, and their uses.

Comprising the book is a total of 23 chapters which are headed as follows: Animal Husbandry; Building and Construction; Cosmetics; Dentistry; Inks and Inkmaking; Insecticides; Leather; Lubricants; Milk Production; Mining and Ore Treating; Oil Production; Paints; Paper and Packaging; Plastics; Polishes and Cleaners (Metal and Glass); Polishes and Cleaners (Wood); Restaurant Sanitation; Road Building and Maintenance; Rubber Production; Textiles; Textiles (Dyeing and Printing); Wool Production; and Miscellaneous.

Motor Generator Products. The Motor Generator Corp., Box PF-26, Troy, Ohio, has released a brochure which provides a preview of MGC products developed during the war years 1941 to 1945. These include lighting plants, electric power sets, stand-by electric units, battery charging sets, buffers and grinders, combination charger-welders, and numerous types of generators and generator sets. Copy of Brochure DM-704 free upon request.

"Steam-Detergent Cleaning with Oakite Solution-Lifting Guns" is the subject of a 28-page booklet published by Oakite Products Inc., 32F Thames St., New York 6, N. Y. Described are many applications of steam-detergent cleaning for (1) cleaning machinery and parts for subsequent repair and overhaul, (2) preparing equipment surfaces for repainting or refinishing, (3) cleaning equipment too large for tank immersion or where suitable tanks are not available, and (4) paint stripping. Copy free upon request.

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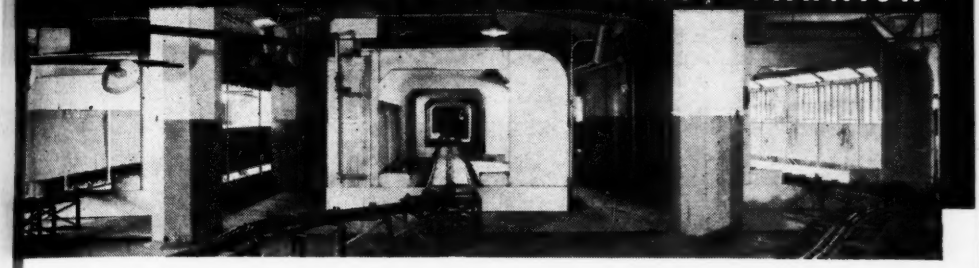

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Electroplating Type Equipment Protected the Navy

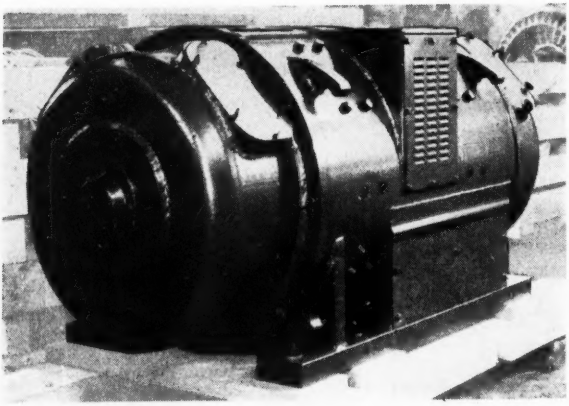
By ROGER V. BAYLIS

Production Manager, Hanson-Van Winkle-Munning Company
Matawan, New Jersey

IT is generally known that plating protected thousands of parts and pieces used by the Navy during the war. The outstanding examples of such protection are the cadmium and zinc plates which were so widely used for corrosion resistance.

Not so generally known, however, is the fact that hundreds of our ships were protected from magnetic mine demolition by degaussing equipment which is similar in character to low voltage plating generators, and that the total quantity of such equipment in use was huge. For example, one manufacturer of electroplating generators alone built a total of approximately 400 degaussing generators at a contract value, together with accessories and spare parts, of almost two million dollars.

Commencing with the pilot installation of degaussing apparatus as supplied by this manufacturer for the ill-fated original aircraft carrier U. S. S. "Wasp," the Navy Department set up an emergency program for the similar equipment of almost every type of service ship, which included nine oilers, eight troop transports, an ammunition ship, a stores cargo vessel, two seaplane tenders, two destroyer tenders, two stores ships, a hos-



Navy degaussing unit consisting of a 60 h.p. 230-volt d.c. motor and 750-amp. 48-volt generator

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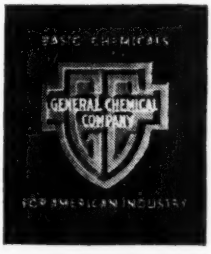

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pital ship, and one submarine tender in the earlier contracts, to meet which the conventional coupled type of motor-generator set was utilized, the units, however, being of all-steel (shockproof) construction.

For combat vessels, a more compact two-bearing set was later proposed and accepted by the Bureau for 11 battleships, 24 heavy cruisers, 46 light cruisers, 31 aircraft carriers, and 59 carrier escort vessels, besides numerous tenders and repair ships. In the design of these sets, the use of castings was largely eliminated in favor of fabricated and welded parts of heavy steel plate. This construction resulted in extreme rigidity and the ability to withstand the shocks of combat to the highest degree. There was no motor-generator unit returned for failure or report of such received while in service, according to the records of the manufacturer up to October 1945.

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"Anodex" 61X for the electrocleaning of buffed copper articles prior to any finishing operation is the subject of a technical data sheet published by MacDermid Inc., Waterbury 88, Conn. The data sheet, which provides typical cleaning cycles for the proper cleaning of any copper coated article, is available free.

"Koroseal" Lined Tanks. Bulletin 47 providing detailed information on "Koroseal" and illustrating its application to tanks in which acids, plating baths, salt and alkali solutions, and organic materials are used is now available free from the Heil Engineering Co., 12901 Elmwood Ave., Cleveland 11, Ohio.

Nox-Rust Chemical Products. In commemoration of its tenth anniversary, the Nox-Rust Chemical Corp., 2423 S. Halsted St., Chicago 8, Ill., has published a 24-page illustrated catalog providing detailed information on its line of scientifically compounded rust preventives, protective coatings, and related industrial chemicals. Copy free upon request.

Nalco Lamps. The North American Electric Lamp Co., 1020 Tyler St., St. Louis 6, Mo., now has available a series of catalog sheets on heavy duty carbon lamps for heating, baking, or sweat box uses; infra-red ray lamps and strip units for radiant drying and heating; photographic carbon lamps for darkroom work, and so on. Punched for insertion in a binder, the catalog sheets can be obtained free upon request.

Manhattan Engineered Finishing Wheels, available in several resiliencies with a synthetic rubber bond, are described in a bulletin issued by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J. In addition to discussing the various features of these polishing wheels, the bulletin contains a table giving maximum safe operating speeds for each type of polishing wheel bond. Also included is a list showing the range of application of other Manhattan rubber and resinoid bonded abrasive wheels.

Copy of the bulletin can be obtained free of charge by writing to the Abrasive Wheel Department of the above firm, requesting Bulletin No. 6881-A.

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Finishing Clinic

A Practical Procedure for Electroplating on Aluminum

BECAUSE of the lightness, availability, and low cost of aluminum, there has been an increasing demand for electroplated finishes on aluminum and its alloys as this metal finds increasing applications in a variety of new postwar products. Consequently, large quantities of aluminum alloys are finding their way into the plating room for finishing. Electroplating on aluminum, in general, is done for two primary reasons—for decorative effects and for protection against corrosion. There are also other reasons, some of which are becoming very important; namely, to promote wear resistance, to facilitate soldering, and for electrical contacts.

Aluminum alloys may be electrolytically protected by zinc or cadmium deposits under some service conditions. Aluminum alloys can be soldered by using special fluxes and solders, but changes in technique and plant practices make it desirable in some cases to electroplate with copper or other metal to facilitate soldering. The use of aluminum in building hardware and similar applications requires the duplication of the numerous plating finish effects now common with other base metals. This involves deposits of silver, copper, nickel, and so on, and often textured and oxidized finish effects. If bonding of rubber to aluminum is required, the aluminum is brass plated with the conventional brass solutions used for this purpose. The greatest use for electroplated finishes on aluminum is for decorative purposes where nickel and chromium, gold, silver, and other metals are applied to aluminum articles to be carried or

worn, such as cigarette lighters, dress ornaments, and bracelets, which are made of aluminum because of its lightness.

Mr. Ralph E. Pettit of the Aluminum Company of America told the Cleveland Branch Electroplaters' Society at their regular December meeting that electroplating on aluminum using the "Zinc Immersion Pretreatment" will probably become as practical and as acceptable commercially as the regular methods in use for plating on other base metals. A flow sheet for electroplating on aluminum alloys using this method was presented at a recent meeting of the Electrochemical Society in New York City (Preprint 88-25 by H. Bengston, Aluminum Company of America). The "Zinc Immersion Pretreatment" is reported to produce adhesive forces between the plated coating and the aluminum as good or better than the rupture strength of the aluminum base metal.

A typical procedure for plating on wrought aluminum alloys consists of the following steps:

Step 1—Clean—The removal of oil or grease films is necessary to permit uniform attack in the subsequent acid etching operations.

Step 2—Chrome Pickle—Time, ½ to 2 minutes. Solution: 175 gm./l. conc. sulfuric acid (H_2SO_4); 35 gm./l. chromic acid (CrO_3). Temperature: 150°F. (65.6°C.).

Step 3—Rinse.

Step 4—Concentrated Nitric Acid Dip—Time, ½ to 2 minutes.

Step 5—Rinse.

Step 6—Zinc Immersion Treatment. Time, ½ to 2 minutes. Solution: 400 to 500 gm./l. caustic soda (NaOH); 75 to 100 gm./l. zinc oxide (ZnO). Temperature: 80°F. (26.7°C.).

Step 7—Rinse.

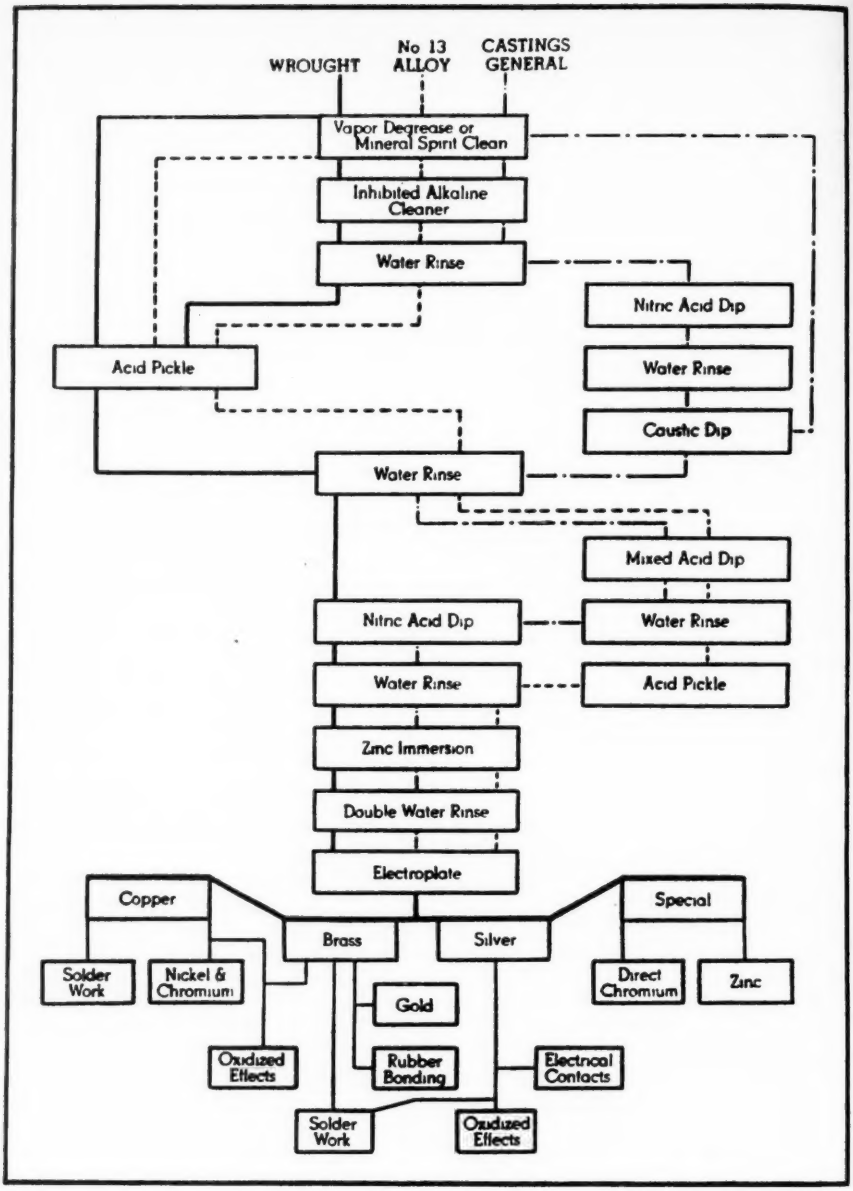
Step 8—Electroplate.

The treatment of aluminum casting alloys differs in that a mixed acid etch is used in place of the chrome pickle. The mixed acid etching solution consists of a mixture of 3 parts of concentrated nitric acid and 1 part of concentrated hydrofluoric acid, used at room temperature.

In a paper before the Annual Educational Session of the Detroit Branch of the American Electroplaters' Society, Dr. Walter R. Meyer (Enthone, Inc., New Haven, Conn.) described a zincate dip for electroplating on aluminum. According to Dr. Meyer, the success of the "Zinc Immersion Predip" is apparently due to the use of very concentrated sodium zincate solutions containing a considerable excess of sodium hydroxide to repress zinc-ion formation. The zinc film produced should be uniformly gray and, if it is spotty, indications are that the pretreatment is not satisfactory. The following metals have been plated satisfactorily upon the zinc film: silver, copper, brass, nickel, and cadmium. The ideal pH range for plating upon the film is from 6 to 10, and solutions that are highly alkaline, such as the cyanide zinc solution or sodium stannate tin solution, cannot be used.

Silver plating can be done satisfactorily directly upon the zinc film. The work is first given a strike in the usual silver strike solution containing approximately 0.3 oz./gal. of silver cyanide and 12 oz./gal. of potassium cyanide; operating temperature, 70-80 deg. F.; current density, from 10 to 40 amp./sq. ft.; time, 30 seconds to 2 minutes. Following this, the work is plated in the usual silver plating solution.

Copper plating solutions recommended for use on the zincate film should have a free cyanide content below 0.4 oz./gal. and a pH not higher



"Zinc Immersion Pretreatment" process flow sheet for electroplating on aluminum

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than 10.5, with an optimum temperature range of 80-90 deg. F. After an initial plate in this solution, the work may, if desired, be transferred to a regular type cyanide copper plating bath. The copper pyrophosphate type bath* has also been found satisfactory for plating over the zinc film.

Nickel plating is possible directly upon the zinc film using the ammonical type nickel plating solution. Nickel from standard nickel plating baths is usually deposited upon a copper plate applied from either the cyanide type copper solution or the pyrophosphate type solution.

Brass plating can be carried out successfully on aluminum using the "Zinc Immersion Pretreatment" without a copper undercoat. The pH of the brass solution should be kept below 10.5

Cadmium plating can be carried out successfully, however, in most cases, a "strike" cadmium solution is used containing approximately 2 oz./gal of cadmium and 8 oz./gal. of total sodium cyanide. After the work has been plated in this solution for about one minute, it can be transferred to a standard cadmium solution.

Procedures are also available for electroplating on aluminum which involve electrochemical oxidation and plating upon the oxide or partially reduced oxide film. The progressive metal-finishing production man will want to keep abreast of developments concerned with electroplating on aluminum, as this metal finds wider commercial application in the postwar era.

* * *

Applications of Bright Dipping and Some Formulas

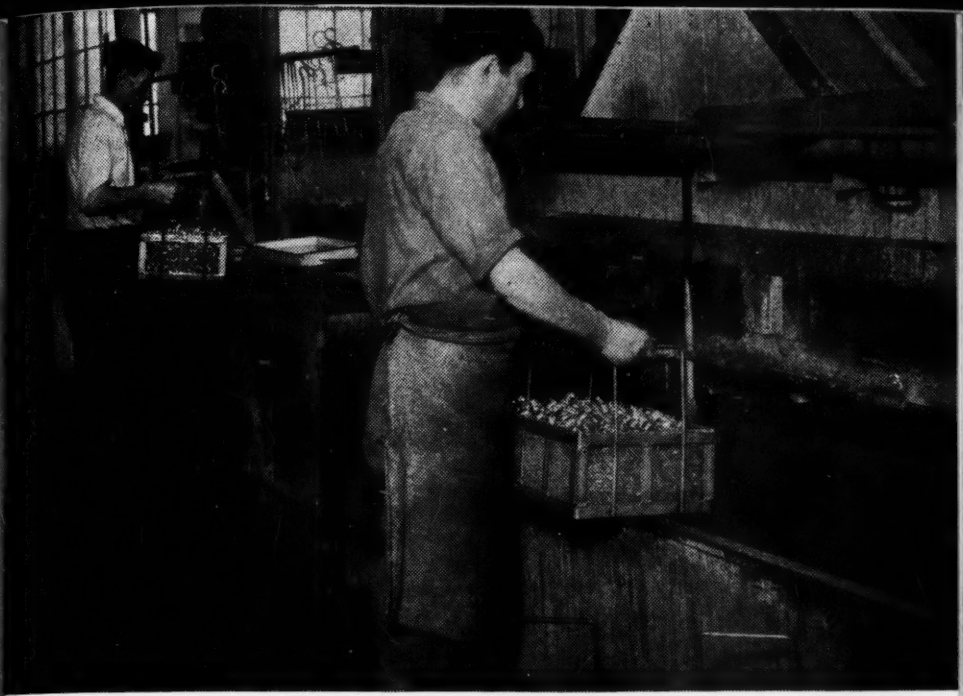
BRIGHT dipping as used in the metal-finishing industry may be defined as a corrosion process whereby the percentage of specular reflectance from a metallic surface is increased without the application of outside electric current. The purpose of bright dipping may be to improve the surface appearance of an article, to prepare the surface for a subsequent treatment such as plating, or to passivate the surface to prevent subsequent corrosion and discoloration and improve paint adherence. Bright dipping is used primarily on solid **copper** and **brass** and on **electroplated coatings** of **zinc, cadmium,** and **brass.**

A number of bright-dipping processes have been recently reviewed and their applications listed (G. Soderberg, Electrochemical Society Preprint 88-10). **Copper, bronze,** and **brass** are frequently bright dipped in the time honored nitric-sulfuric-muriatic bath. One bath recommended for bulk dipping has as the final bright dip a composition of 800 gm./l. H_2SO_4 (sp. gr., 1.84); 100 gm./l. HNO_3 (sp. gr., 1.38); 2.5 gm./l. HCl (sp. gr., 1.17); and 491 gm./l. H_2O at a maximum temperature of 35 deg. C. (91 deg. F.).

Since considerable heat is evolved in the above bright-dip reaction and since relatively minor changes in composition of the bath effect the color produced, it is common practice to do the necessary surfacing in a preliminary dip. This so-called "scaling dip" contains less sulfuric acid and is more active than the regular bright dip. A typical analysis is 700 gm./l. concentrated H_2SO_4, 100 gm./l. concentrated HNO_3, 5 gm./l. concentrated HCl, and 544 gm./l. H_2O. The time of immersion in this dip is long enough to produce the desired smoothing of the surface at whatever temperature is reached. The optimum color is then brought out in the regular bright dip in a few seconds.

Another bright dip that has been proposed consists of 50 per cent sulfuric acid, 36 per cent nitric acid, and 14 per cent phosphoric acid (U.S.P.

* "Unichrome" Bath, product of United Chromium, Inc., New York.



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A parts supplier was using a standard brand of solvents for cleaning parts before shipping, but found the long drying period was slowing up production.

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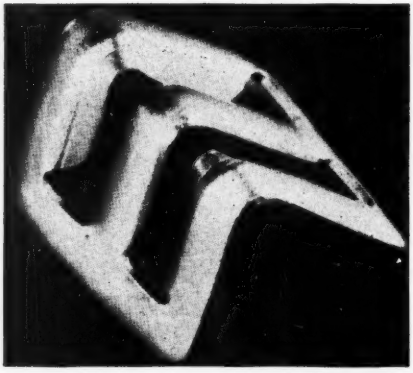
1,984,534). Another solution, which was widely used during the war, especially in automatic operations, contains 80 c.c. H_2SO_4, 20 c.c. HNO_3, 1 c.c. HCl, 55 to 60 gm. CrO_3, and 200 c.c. of water (U.S.P. 2,172,171). The chromic acid is added to inhibit the evolution of nitrous gases, thereby decreasing the health hazards, and to reduce the reaction rate, thus making it possible to transfer the dipped parts



Aluminum buckle that has been nickel plated using the "Zinc Immersion Pretreatment." Note adhesion at sharp bend. (*Courtesy Enthone, Inc., New Haven, Conn.*)

more slowly and with less drag-out loss, and to passivate the metal. This composition is reported to be particularly suitable for use on thin plated coatings.

Bright dips for **cadmium** and **zinc plate** are generally adjusted for operation at room temperature and produce the desired brightness on a smooth electroplate in a few seconds, or up to less than one-half minute, without the removal of more than a very small percentage of the electroplate. An aqueous solution of 0.5 to 1 per cent by volume of concentrated nitric acid has been proposed for cadmium (U.S.P. 1,816,837). It is reported that the discoloration of cadmium plated parts packed closely together is accelerated when this dip has been used, probably due to the formation of ammonium salts. A weaker dip containing 0.25 to 0.5 per cent by volume of concentrated HNO_3 has been used very successfully on zinc plate, being less sensitive than several other dips to the presence of such impurities as copper in the plate.

A number of chromic acid dips have been developed (U.S.P. 2,021,592; 2,186,479; 2,194,498) to overcome the tarnishing of cadmium plated parts packed closely together and to provide a degree of passivity to the surface. Preferred solutions, the use of which does not require after-treatment, are: for cadmium rack work, 100 gm./l. CrO_3 and 1.67 gm./l. H_2SO_4; for cadmium barrel work, 100 gm./l. CrO_3 and 1 gm./l. H_2SO_4. A suitable solution for brightening of zinc plate consists of 200 gm./l. CrO_3, 15 gm./l. Na_2SO_4, and 52.5 gm./l. HNO_3 (U.S.P. 2,088,492). A solution containing, by weight, 25 per cent CrO_3, 10 per cent HCl, and 65 per cent H_2O has been recommended for zinc alloys containing copper (U.S.P. 2,125,458). Following this latter bright dip the parts are rinsed in water and then immersed in a 10 per cent CrO_3 solution until the slight coloring produced in the first solution disappears.

Acidified hydrogen peroxide solutions are being used for the bright dipping of both **cadmium** and **zinc plates** (U.S.P. 2,154,455; 2,154,468; 2,154,451; 2,154,469). Preferred formulas are: for cadmium, 7 per cent by volume of 30 per cent hydrogen peroxide with 0.3 per cent by volume H_2SO_4 (sp. gr., 1.84); for zinc, 4 per cent by weight H_2O_2 and 0.25 per cent by weight H_2SO_4. The hydrogen peroxide bright dips have the advantage that the reaction products are water and the metal salts, which later can be tolerated in large amounts.

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Tin Undercoats Improve Corrosion Resistance of Painted Steels

IN a study reported to the British Iron and Steel Institute by Dr. E. S. Hedges and Dr. L. A. Jordan, it was found that electrodeposits of tin from both the alkaline and acid tin baths using thicknesses of 0.000008 inch and 0.00003 inch had a marked effect in retarding the corrosion of painted steels. Twelve different paints were applied, including linseed oil paints, nitrocellulose lacquer, stoving paints, and air-drying japans. A diagonal scratch, 2 inches long and penetrating to the steel, was made on the face of each panel prior to exposure under the three conditions of test: outdoor exposure, accelerated weathering, and accelerated corrosion.

The results show that with every painting system used in the study the corrosion of the plain steel panels was much greater than with any of the plated panels. Comparison of the electrotinned panels revealed no appreciable difference between the coatings from the acid bath and those from the alkaline bath. The 0.00003-inch tin coating was found more effective than the 0.000008-inch coating, but the 0.000008-inch coating appeared effective when compared with plain steel. In general, the as plated tin coatings appeared better than those that had been melted. Also, the relatively thick commercial hot-tinned coating was very effective, but the adhesion of paint did not appear to be as good as with the electrotinned coatings. The data are of interest to the metal-finishing production man concerned with painting of tin plate.

* * *

Engineering of Infra-Red Heating for Drying and Baking

THE finishing engineer contemplating the possibility of infra-red heating for production use should keep in mind the fact that economies of this method of radiant heating vs. other heating systems cannot be made apparent on a basis of simply comparing British thermal units involved. The user of a properly engineered infra-red installation will find that it provides for maximum production, low equipment, installation and maintenance costs, maximum flexibility and ease of control, minimum number of rejects; small space requirements, and maximum safety and cleanliness ("Steel," 117 (6) 116, 1945).

In many uses, the difference between low and high costs depends upon the correct engineering approach to the application of infra-red heat. Most economical use of radiant energy of the infra-red type involves at least two zones—a heating zone and a holding zone. These are inherently separate sections because the work to be done in them is different. In the first zone, the job is essentially a mass heating operation to bring the mass up to the desired temperature. In the second zone, infra-red energy is applied to the work in sufficient concentration to maintain the temperature developed in the mass heating operation. Thus, the first zone is mainly a heating section; the second, a holding section.

Some installations for baking normal synthetic enamels utilize a four-zone oven, where the first or entering section is a preheating zone using hot exhaust gases. No infra-red lamps are used in this portion of the oven. The preheating zone fills a two-fold purpose — preheating entering work, thereby increasing overall thermal efficiency, and boiling off the highly volatile solvents. Next, the work enters the mass heating zone where the concentration of infra-red lamps quickly raises the temperature to that of full baking requirements. In the third or holding zone, spacing out the lamps maintains the temperature of

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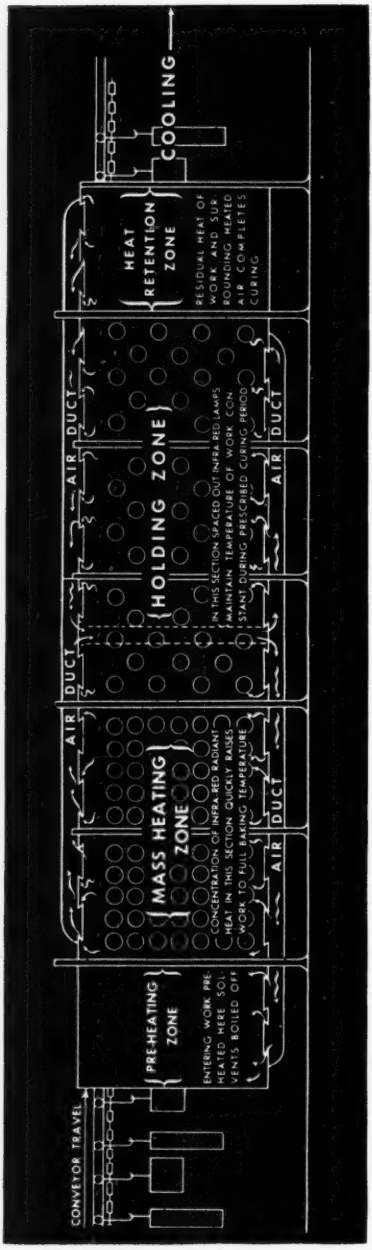
CONVEYOR TRAVEL
PRE-HEATING ZONE
ENTERING WORK PRE-HEATED HERE SOLVENTS BOILED OFF
MASS HEATING ZONE
CONCENTRATION OF INFRA-RED RADIANT HEAT IN THIS SECTION QUICKLY RAISES WORK TO FULL BAKING TEMPERATURE
AIR DUCT
AIR DUCT
HOLDING ZONE
IN THIS SECTION SPACED OUT INFRA-RED LAMPS MAINTAIN TEMPERATURE OF WORK CONSTANT DURING PRESCRIBED CURING PERIOD
AIR DUCT
HEAT RETENTION ZONE
RESIDUAL HEAT OF WORK AND SURROUNDING HEATED AIR COMPLETES CURING
COOLING

Diagram of four-zone infra-red oven satisfactory for ordinary synthetic enamel finishes

the work constant during the prescribed curing period while heat is distributed by conduction throughout the entire mass of the parts being finished. In the fourth or heat retention zone, no lamps are used and the residual heat of the work and surrounding heated air complete the curing of the finish. Into this fourth zone is added the make-up air which is warmed by the residual heat of the work.

Zone arrangement can be modified as required. For example, in the baking of certain wrinkle finishes, the low-heat zone comes ahead of the high-heat zone. Since the length of time the work remains in any particular zone is a function of the conveyor speed and length of that zone, it is easy to design an infra-red oven for almost any heating cycle.

* * *

The Measurement of Reflectance in the Porcelain Enameling Plant

THE application of the principles of photometry in the porcelain enameling industry to determine optical properties of porcelain enameled surfaces has expanded markedly within the past ten years. The relatively recent appearance of the Photovolt photoelectric reflection meter makes available to the industry an instrument which is readily adaptable to making reflectance measurments on ware from the production line. According to a description by B. J. Sweo in the November 1945 issue of "The Enamelist," it consists of a photoelectric instrument comprising two units, a control unit which contains the indicating instrument and controls, and the search unit which contains the light source and the photocells. The two units are connected by a flexible cable having a plug connection.

The Photovolt Reflectometer offers the advantage that the test pieces may be of any size, and, therefore, it is not necessary to prepare small sam-

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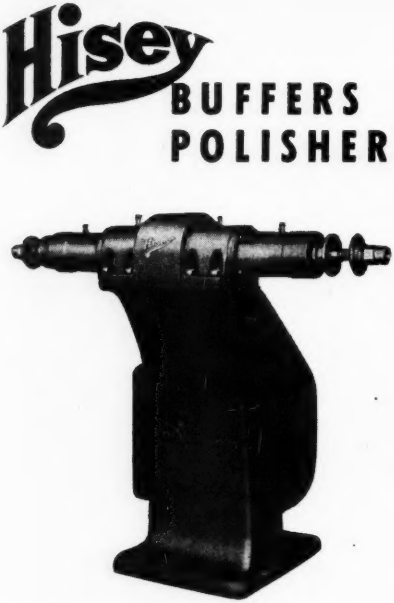

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ples to be inserted into the instrument. Complete panels of stoves or refrigerators may be tested even after assembly. The instrument provides an ideal means of determining uniformity of coating over the entire area of large parts. The operation of the instrument is very similar to that of the General Electric thickness gage. The production man may find this a useful tool for the rapid testing of porcelain enameled finishes.

Nalco Portable Infra-Red Ray Drying Units. A four-page folder illustrating and describing how Nalco Portable Infra-Red Ray Drying Units are used to speed automobile refinishing and touch-up is now available from the North American Electric Lamp Co., 1020 Tyler St., St. Louis 6, Mo. Punched for insertion in a binder, the folder also includes complete tabular and other information on the various models of drying units. Copy free upon request.

German Soap Industry and Chemical Developments. Detailed information on the German soap industry and on German chemical developments in emulsifying agents and synthetic detergents and wetting agents is presented in three comprehensive reports now available in both photostat and microfilm form, the Office of the Publication Board announces. The serial numbers, titles, authors, and prices of the reports are as follows:

No. 2421. The German Soap Industry, by M. L. Sheely (59 pages; $4.00 per photostat copy; $1.00 per microfilm copy).

No. 3867. German Chemical Developments in Emulsifying Agents, by Lester F. Hoyt (46 pages; $4.00 per photostat copy; 50 cents per microfilm copy).

No. 3868. German Chemical Developments in Synthetic Detergents and Wetting Agents, by Lester F. Hoyt (151 pages; $11.00 per photostat copy; $2.00 per microfilm copy).

Reports 2421, 3867, and 3868 may be ordered in Room 1326, Commerce Building, or by mail. Mail orders should be accompanied by check or money order, made payable to the Treasurer of the United States, and should be addressed to the Office of the Publication Board, Department of Commerce, Washington 25, D. C.

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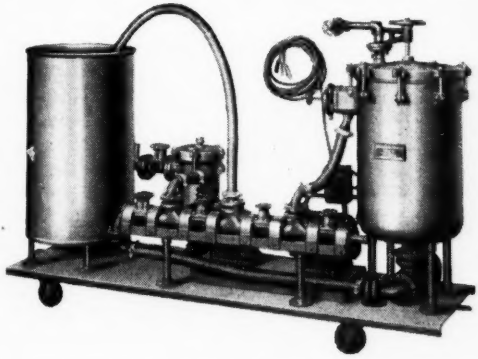
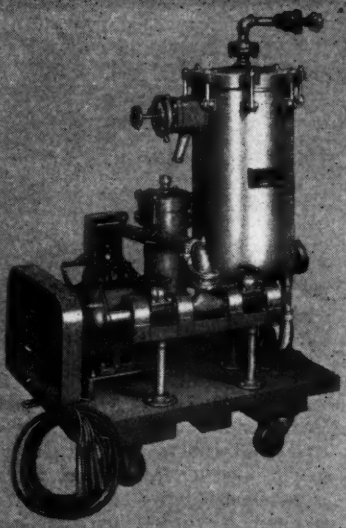


No. 1—Filter shown is equipped with slurry tank with double suction and discharge control providing an ideal continuous filtration system.



No. 2—A typical portable filter as constructed for bright nickel, acid copper and other acid type baths. Used for either intermittent or continuous filtration.

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Part IX

FOR a proper understanding of the principles underlying the processes of electrodeposition, it is necessary to consider some of the fundamentals of the structure of matter. Not so many years ago, students of chemistry were taught that the atom was the smallest particle of matter into which an element could be divided. The name **atom** itself is derived from Greek words signifying something that cannot be divided, yet it is now known that the structure of the atom is as complex as that of the solar system and in many ways resembles it.

The atom consists of a small heavy nucleus around which revolves one or more electrons sometimes called planetary electrons since they revolve in orbits like the planets. The electrons are infinitely larger in **size** but infinitely lighter in **weight** than the nucleus.

To the best of our present-day knowledge, the electron is the fundamental, indivisible unit of matter from which the universe is built. At the same time, it is the smallest particle of electrical energy, each electron carrying a negative charge a little greater than one ten-billion billionth part of a coulomb. To be more exact, when one ampere of current is flowing through a circuit, 6.28 billion billion electrons are passing a given point each second.

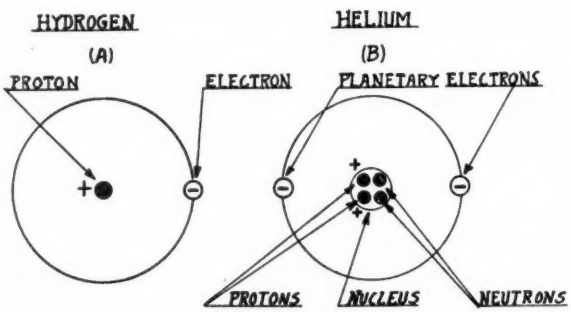

Fig. 41—Diagrammatic conception of the structure of the hydrogen and helium atom

The nucleus has a positive charge which is equal to the total negative charges on the electrons. Thus, the normal atom is electrically neutral since the positive nuclear charge just balances the nega-

tive charges on the planetary electrons.

Hydrogen, the lightest element, has the simplest structure. It consists only of a nucleus and one electron, the nucleus being one proton or positive charge. As the elements increase in atomic weight, their structures become more complex. The nucleus adds more and more protons and some neutrons until uranium, the heaviest metal (except for neptunium and plutonium) is obtained. Its atom contains 92 planetary electrons; 146 neutrons and 92 protons make up its nucleus.

A neutron is, as its name implies, neutral in charge because it consists of a positive proton very closely combined with a negative electron. Thus, when a neutron is added to a nucleus, it adds to the weight of the atom but has no effect on the electric charge.

Illustration (A) in Fig. 41 is a diagrammatic conception of the structure of the hydrogen atom and (B) that of helium. The atomic number of an element is equal to the number of its protons. The atomic weight of an element is approximately equal to the sum of its protons and neutrons. For example, hydrogen has an atomic number of 1, an atomic weight of 1.008; helium, an atomic number of 2, atomic weight of 4.003; boron, an atomic number of 5, atomic weight of 10.82.

The diagram (B) in Fig. 41 is merely a conventional way of showing the electron groups. Actually, each electron revolves in a different orbit, but several orbits may have the same diameter and the electrons in them are said to occupy the same space shell.

In Fig. 42 is represented the electron arrangement of the boron atom, with

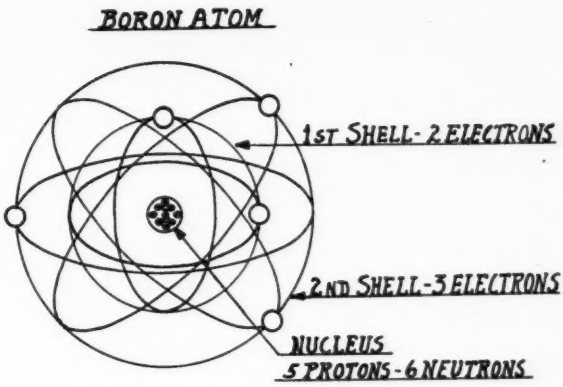

Fig. 42—Electron arrangement of the boron atom

2 electrons in the first shell and 3 in the second shell. Planetary electrons of atoms can be removed by the application of such forces as friction, heat, electric potential, light sources, and chemical action. Electrons in the outer space shells of atoms are less closely held and, therefore, more easily removed.

When an atom loses an electron or one negative charge, it changes from its state of electric neutrality to one of positive charge. If an atom picks up an electron that has been lost by another atom, it also loses its neutrality but becomes negatively charged. Atoms that have acquired a charge, either positive or negative, are called ions.

The cause of formation of static electricity which was discussed in Part I of this series is now apparent. When, for instance, friction is applied between a glass rod and piece of silk, some of the electrons are rubbed off from the glass onto the silk. The silk, therefore, becomes negatively charged and the glass, positively.

Not only atoms but also molecules or groups of atoms of different elements can acquire negative or positive charges, thus becoming ions. It is only because of the ionization of atoms and

molecules that electrodeposition is possible.

According to presently accepted theories, metallic salts in the solid state are made up of positive and negative ions. Since the charges are equal in amount, the salt crystal is neutral, but, as soon as it dissolves in water, the ions, no longer bound by the forces that held them in the crystal, are free to move about in the solution.

A plating bath consists of a solution of various chemicals in water. For the purpose of illustration, let us consider a simple plating bath such as an acid copper solution. This contains three ingredients; namely, cupric sulfate ($CuSO_4$), sulfuric acid (H_2SO_4), and water (H_2O). Assume that the anodes are of pure copper.

When a copper sulfate molecule dissolves in water a positive copper ion, designated as Cu^{++} and a negative ion, SO_4^{--}, are let loose. Similarly, the sulfuric acid molecule becomes 2 positive hydrogen ions, H^+, and a negative ion, SO_4^{--}.

When voltage is applied to the plating bath, the principles discussed in

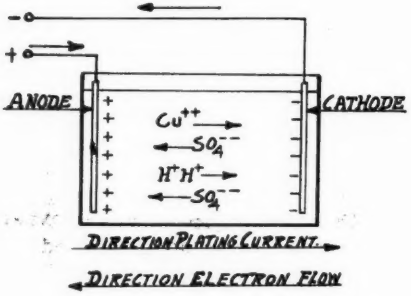

Fig. 43—Reaction occurring when voltage is applied to plating bath

Part I, governing attraction and repulsion of unlike and like charges, cause the ions with positive charges to start migrating toward the negatively charged cathode and the negative ions toward the positive anode. Ions traveling toward the anode are called anions and those seeking the cathode are known as cations. This distinction in the naming of ions and electrodes should not be confused. Positive electrodes are called anodes and negative

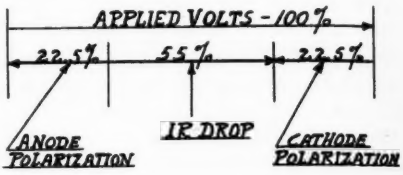

Fig. 44—Diagram showing percentages into which total voltage applied to nickel solutions is divided

electrodes, cathodes; but positive and negative ions are named cations and anions respectively. Their destination determines the names of ions, whereas electrodes are designated for their electrical charges.

Referring to Fig. 43, when a copper ion with its two positive charges, Cu^{++}, (which means the atom has lost two electrons) reaches the cathode, it picks up two electrons or negative charges. It thereby becomes electrically neutral again and changes into a copper atom which deposits on the cathode. This process repeated billions of billions of times produces the copper plate. It may be represented graphically thus: Cu^{++} plus 2 electrons $(--) = Cu$ ⊖ neutral atom.

Metals such as copper, zinc, cadmium, and nickel, when immersed in solutions containing their own ions, give up electrons rather easily and go into solution forming positive ions. Thus: Cu ⊖ minus 2 electrons $(--) =$ Cu^{++} ion.

Therefore, in the process shown in Fig. 43 as the negative SO_4^{--} ions pass over to the anode their negative charges are absorbed and copper atoms are continually passing into so-

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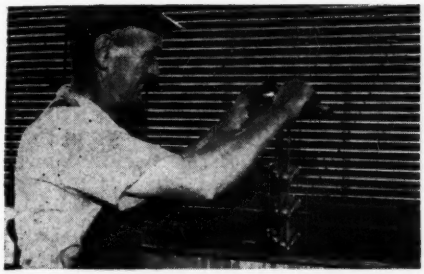

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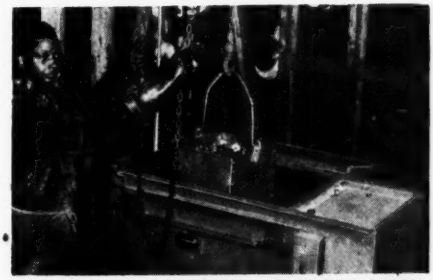

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TABLE VI

1 Temp. Solution	2 Current Density	3 Average Polarization Volts Anode	4 Cathode	5 Total	6 Average IR Drop	7 Total Volts Applied Average	8 Range
80° F.	30 ASF	1.18	1.32	2.50	2.72	5.22	7.4-5.2
120° F.	30 "	0.85	0.92	1.77	1.88	3.65	6.7-3.5
80° F.	50 "	1.95	1.72	3.67	4.45	8.12	8.9-7.1
120° F.	50 "	1.24	1.29	2.53	3.09	5.62	6.6-5.0
80° F.	80 "	2.95	2.25	5.20	6.50	11.70	13.8-10.5
120° F.	80 "	1.68	1.84	3.52	4.64	8.16	8.9-7.6

lution as copper ions, thus maintaining the copper content of the bath.

If an insoluble anode were used, the SO_4 ions would react with water molecules forming sulfuric acid, and oxygen gas would be evolved at the anode. This would soon result in a build-up of acidity in the bath and a lowering content of copper ions.

One conclusion evident from a study of Fig. 43 and the reactions taking place is that, while the voltage applied to the plating bath is sending a current through the solution from anode to cathode (according to the conventional theory), there is a steady stream of electrons flowing in the reverse direction, being given off at the cathode and abosorbed at the anode. When a potential is applied to a plating bath, the current which flows through the solution is not as large as that called for by Ohm's law. This is due to the fact that the applied voltage meets opposition at the anode surface and also at the cathode surface. This opposing potential at the anode and cathode is of opposite polarity to that of the applied voltage and is, therefore, called a counter potential or counter electromotive force. It is a result of what is commonly termed "anode polarization" and "cathode polarization."

As a result of this polarization, some of the applied voltage is used to overcome the combined opposing potentials and the current that flows through the bath is that due to the difference between the applied voltage and the sum of the polarization potentials.

Some concrete figures will be taken from data gathered by the author on nickel plating solutions and presented before the American Electroplaters' Society Convention in 1935.* The data were obtained through experimenting with solutions of the Dr. Watts type, the polarization voltages being measured by means of a Haring Cell.** Solutions varying in metal content from 2.0 to 12.8 ounces per gallon of nickel metal were run at current densities ranging up to 100 amperes per square foot. Nickel chloride content was maintained at 3.0 ounces per gallon and boric acid at 4.0 ounces per gallon.

Table VI contains some averaged values from the data collected from the experiments mentioned above. Certain conclusions can be drawn from the values in this table:

(1) The total voltage necessary to obtain a certain current density decreases as the metal concentration increases and also as the solution temperature increases.

(2) The polarization voltages increase as the current density increases but are less at the higher temperatures.

(3) The ratio of total polarization volts to total applied voltage decreases slightly (0.48 to 0.43) as current density increases, but for all practical purposes is about constant.

(4) On the average, 45 per cent of the total voltage applied is polarization voltage, about equally divided between anode and cathode polarization; the other 55 per cent is IR drop through the solution. This is shown

* "Optimum Metal Concentration of Nickel Solutions," D. A. Cotton.
** H. E. Haring, Trans. Electrochem. Society, Vol. 49, 1926.

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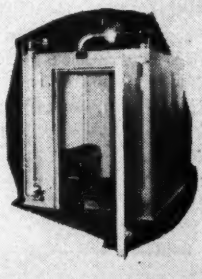

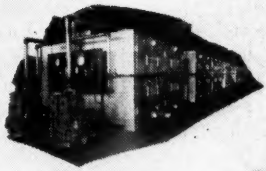

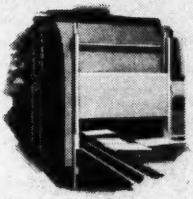

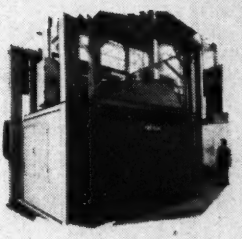

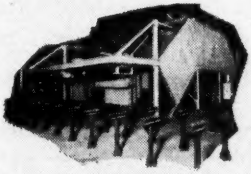

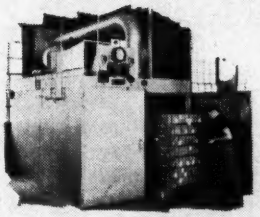

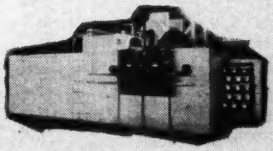

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graphically in Fig. 44. Some of the economics of plating baths are worth a brief discussion.

Referring to Table VI, column 7, it will be noted that the average applied voltage is in every case about 30 per cent lower for the warm solution (120° F.) than for the cold (80° F.). The voltage applied to a bath is important from an economic point of view for, although it is the ampere-hour that

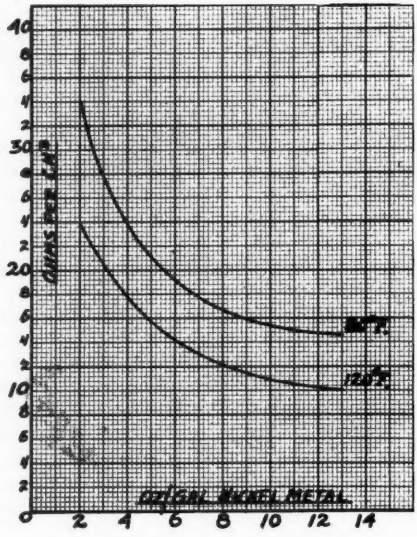

Fig. 45—Chart showing resistivity of nickel solutions

puts on the plate, it is the volt-ampere-hour of watt-hour that must be paid for.

Since the IR drop through the nickel solution mentioned above represents 50 per cent of the total voltage applied, one of the simplest means of reducing voltage is to reduce **R**, the resistance of the bath. This can be done in two ways by (1) increasing the concentration of the bath and (2) increasing the temperature of the bath.

Referring to Fig. 45 which was made up from data taken from the experiments quoted above, it is seen that the resistivity of the 2-ounce per gallon nickel metal solution is 34 ohm-centimeter-cube at 80° F. and that of the 8-ounce per gallon solution is 16.8 ohm-centimeter-cube, a decrease of about 50 per cent. Also, the resistivity drops about 30 per cent more when the solution is heated to 120° F. Note in this connection that whereas metals increase in resistance as temperature rises, aqueous solutions decrease in resistance.

It is also obvious that with warm solutions having adequate metal concentration, plating can be done at much higher current densities, which means that for a given amount of plate applied, the plating time can be shortened. This makes possible the use of smaller plating units.

At the time these experiments were made, nickel was being plated commercially at current densities not over 30 to 40 amperes per square foot, yet the author obtained beautiful samples of nickel plating at 100 amperes per square foot with solutions containing 12 ounces per gallon of nickel metal with 6 ounces of nickel chloride per gallon to furnish satisfactory anode corrosion and conductivity.

These experiments were started with solutions containing 3 ounces of nickel chloride per gallon with the expectation that as the metal content was raised and higher current densities were used, it would be necessary to increase the nickel chloride content. The first indication of this came when the metal content had been raised to 12.5 oz./gal. and current density to 50 amp./sq. ft. at 80° F. The anode polarization rose to 2.4 volts, about 23 per cent above normal. When the temperature was raised to 120° F., the polarization dropped to 1.3 volts, a normal value. At 80 amp./sq. ft. and 80° F., the anode polarization rose still farther out of bounds to 4.4 volts, nearly

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50 per cent above normal, but dropped to 1.7 volts at 120° F., again a normal average.

At this point, the nickel chloride content was increased to 6 oz./gal. This gave an anode polarization of 1.6 volts at 80° F. and 50 amp. /sq. ft. and 2.3 volts at 80 amp./sq. ft., both well under the previous averages for the same current density and temperature while using the lower chloride content solutions. It is thus apparent that abnormal anode polarization is closely related to poor anode corrosion, and nickel anodes may become "passive" when insufficient chloride is present.

Excessive anode polarization occurs in other plating baths due to deficiency in some essential ingredient. For instance, in copper cyanide baths, it is likely to be due to insufficient free cyanide content. Many other reactions pertinent to plating principles, such as "hydrogen overvoltage," "single potentials," "electromotive series" and others, could with profit be included in a discussion of this kind, but lack of space forbids.

The next article in this series will deal with the various sources of power supply for electroplating.

Wabash - Birdseye Infra - Red Lamps for radiant heat is the subject of a booklet announced by the Wabash Corp., 345 Carrol St., Brooklyn 31, N. Y. The booklet lists many of the uses for infra-red, including baking, drying, preheating, and dehydrating. Copy free upon request.

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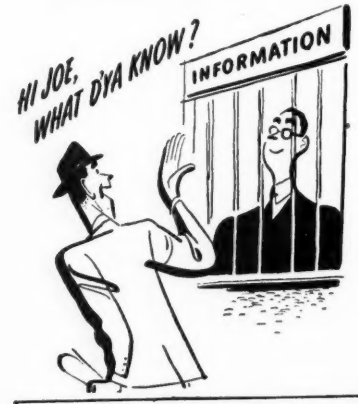

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A NEW power brushing technique used in connection with the deburring and removal of sharp edges around drilled holes in malleable and bakelite ball bearings separators has speeded up the operation 400 per cent, according to a field report received from a New York manufacturer by The Osborn Manufacturing Company, Cleveland, producer of power brushing equipment.

The new method permits not only the deburring of several separators in one operation, the report states, but enables the work to be deburred on both inside and outside diameters at the same time. On the malleable separators, the sharp edges are removed and the outside diameter and bore are deburred in a single operation, while on the bakelite separators, the flashing is removed and the outside diameter and bore are deburred simultaneously. These operations are shown in accompanying illustrations obtained through the courtesy of

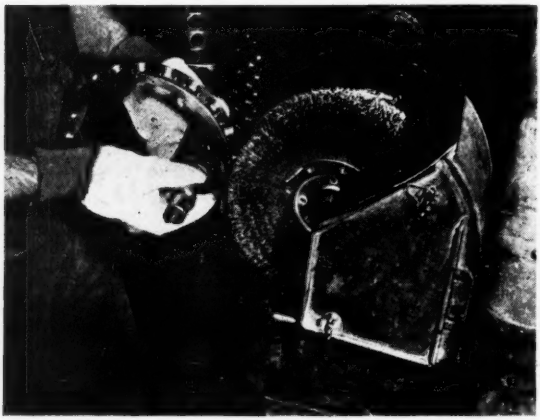


Fig. 1—Close-up view of a double-spindle polishing lathe on which Osborn Monitor Section power brushes are mounted and showing the method by which both inside and outside diameters of ball bearing separators are deburred simutaneously by a new technique for increasing the number of pieces handled

The Marlin - Rockwell Corporation, Jamestown, New York.

For the outside diameter work, Osborn 10-inch Monitor steel wire sections incorporating 0.0095-gauge wire and 1¼-inch arbor holes are used, the sections being operated at a speed of 1,800 revolutions per minute on a double-spindle polishing lathe, as shown in Fig. 1. Four of these steel wire sections are mounted together for this part of the operation.

The inside diameter operation is accomplished at the same time by using several Ringlock sections on a steel fixture. The rotation of the larger brush against the outside diameter spins the bores of the separator against the stationary Ringlock sections, which are built up to a width sufficient to accommodate two or more separators, as shown in Fig. 1.

Three sizes of brushes are mounted together for the inside diameter operation; namely, one ¾-inch brush with a ½-inch arbor hole and using 0.005-gauge wire, another brush 1 inch in diameter with a ¼-inch arbor hole and with 0.003-gauge wire, and a third brush 2½ inches in diameter with a ½-inch arbor hole and using 0.005-gauge wire.

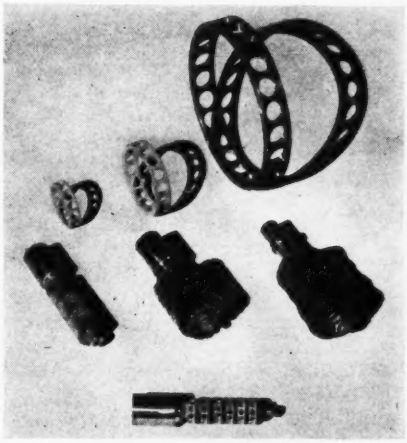


Fig. 3 — Illustration depicting three different sizes of ball bearing separators on which the new power brushing technique is being used, the size of the inside diameter brushes and the holding tools employed

The technique employed in the actual deburring operation is shown in Fig. 2. Fig. 3 shows three different sizes of ball bearing separators on which the technique is employed.

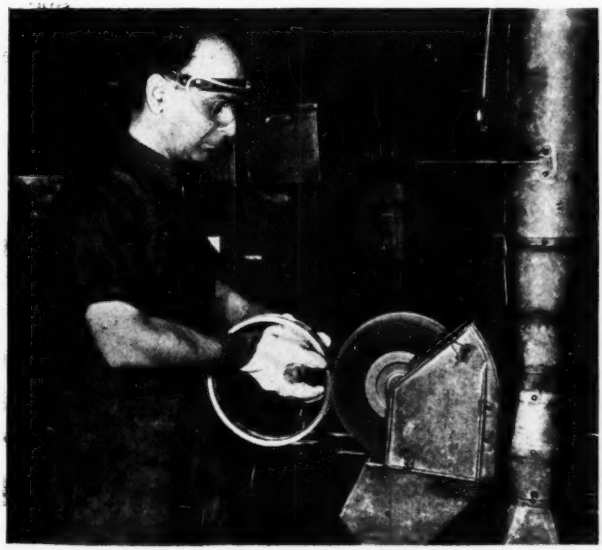


Fig. 2—Illustration showing how the ball bearing separator deburring operation is performed

New Cleaning Machine Removes Scale from Welded Seams of Automotive Parts

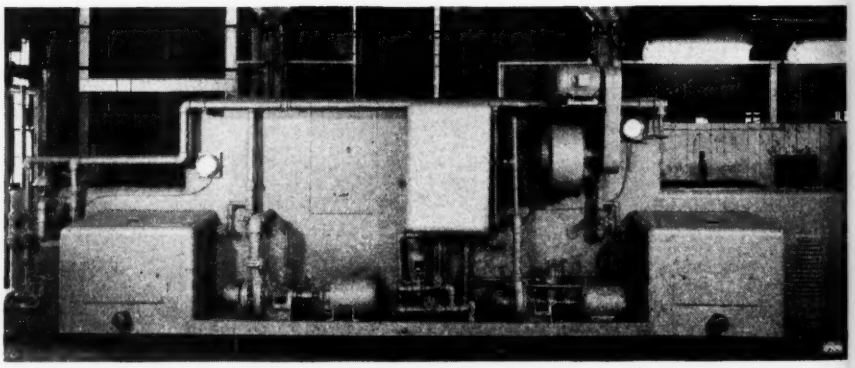
THE Howard Engineering & Manufacturing Co., 2278 Buck St., Cincinnati 14, Ohio, is the producer of a cleaning machine which was developed to solve one of the conversion problems of a leading automotive manufacturer.

In using one of the processes developed in wartime manufacturing, the automotive plant found that it could substitute a stamped and welded tube for the conventional cast and machined rear axle housing, with substantial savings in materials and machining costs. In practice, however, it was found that when the two formed halves of the housing were seam welded together, a loose scale formed on the interior of the housing near the welds. It was feared that this scale would eventually flake off and mix with the differential gear lubricant to form an abrasive that would harm the gears.

Howard engineers discovered that even high pressure sprays would not remove the scale and turned to a mechanical method of removal. The machine that was developed conveys the axle housing through on a conveyor belt with an indexing arrangement that stops the housing at one station where a revolving steel brush enters the housing to brush loose the scale. At the same time, cleaning solution is fed through and around the brush as well as on the exterior of the axle, flushing away the scale and other foreign matter. At the second station, the housing is dried with hot air.

The conveyor belt of the machine incorporates fixtures that hold each axle housing in the correct position during both the brushing and drying operation. Operation of the brush into and out of the housing is accomplished by an air cylinder operated in conjunction with the indexing of the belt.

The machine is furnished completely piped for steam, air, water supply, and drainage. Connection of the four services and electrical power complete the installation of the machine in the plant.



Cleaning machine for removing scale from welded seams of automotive parts

If it's a new, different or better industrial finish you want — look to Pratt & Lambert-Inc.

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Industrial Finishes
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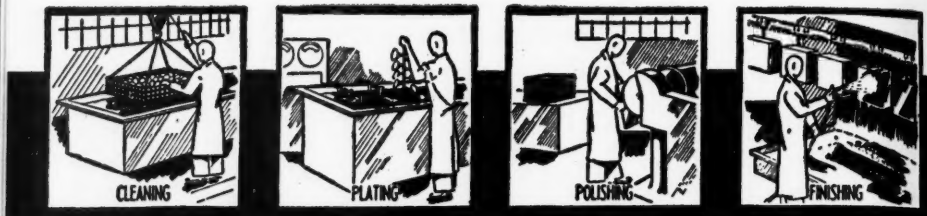

News of the Industry

Neilson Appoints Representative

R. Izzett has been appointed Illinois representative for the Neilson Chemical Co., Detroit, Mich., manufacturer of

R. Izzett

"Prep" products for cleaning and preparing metals for painting and spot welding.

Mr. Izzett has many friends in the finishing industry and for the past 12 years was associated with the Caterpillar Tractor Co., Peoria, Ill. Mr. Izzett will have his headquarters in Chicago.

Company Name Changed

The Enthone Co., New Haven 2, Conn., manufacturer of plating equipment and supplies, announces the change of its name to Enthone, Inc. The company was operating as a partnership and the corporation has assumed all assets, liabilities, and good will.

The officers of Enthone, Inc., are Walter R. Meyer, president; J. F. Buckman, vice president and treasurer; and Clarence C. Helmle, secretary. Dr. Meyer has been actively associated with Enthone since 1942 and was formerly editor of "Metal Finishing." Prior to that he spent 7 years with the General Electric Co., Bridgeport, Conn., as an electrochemist and metallurgist.

Mr. Buckman has been associated with Enthone since its founding and has been actively engaged in the finishing industry for the past 20 years. Mr. Helmle has been with the company since 1943 and preceding that spent 11 years with the General Electric Co., Bridgeport, Conn., as a chemical engineer.

To Head Pennsalt Washington Office

G. Webber Knight has been appointed manager of the Washington, D. C., office of the Pennsylvania Salt Manufacturing Company. Mr. Knight, whose office is Room 201, 1022 17th St., N. W., will look after all company interests in the nation's capital. His office will serve as a clearing house for all Pennsalt matters involving both domestic and foreign government agencies.

Well known in the chemical industry, Mr. Knight has been with the company for 21 years in managerial positions.

Zapon Appointments

The appointment of Robert A. Stevens, Jr., and Kenneth S. Lord to its expanded sales staff is announced by the Zapon Division of Atlas Powder Co., Stamford,

Robert A. Stevens, Jr.

Conn. Mr. Stevens, who is assisting in the Stamford office of Zapon on sales work for the New England district, was employed by the New York, New Haven & Hartford Railroad before entering the Army.

Mr. Lord, a former captain navigator in the Army Air Force, has been assigned to cover Eastern Pensylvania as sales engineer. He was employed by Zapon before entering the service in 1943.

Laurence E. May Passes

Laurence E. May, nationally known chemist of The Sherwin-Williams Company, died recently at his home in La-Porte, Ind., at the age of 51. Mr. May joined Sherwin-Williams 30 years ago, shortly after graduating from Bradley College, Peoria, Ill. At the time of his death, he was general superintendent of the Pigment, Chemical and Color Manufacturing Departments at the Chicago Sherwin-Williams plant.

As an experimenter and teacher, Mr. May was largely responsible in bringing the Sherwin-Williams Chemical Department to its present high position in chemical and color manufacturing. He was widely known in the Color and Chemical fraternity for his work on dyestuffs and intermediates. Several years ago, he was treasurer of the Chicago Chapter of the American Chemical Society. At the time of his death, he was a member of the Chemical Club of Chicago and National Consular of the American Chemical Society.

Personnel Additions at Pennsalt

William R. Watson has returned to the Pennsylvania Salt Manufacturing Company's Special Chemicals Division after service in the Pacific as a Naval Lieutenant (j. g.). Two trainees have also joined the division. They are H. Roper Davis, who formerly worked for the Fercleve Corp., Oak Ridge, Tenn., and John W. Beaver, recently discharged from the Army Air Force. Mr. Beaver was formerly with The B. F. Goodrich Company.

Rejoins Magnus Chemical

Dave Blount has rejoined the Magnus Chemical Co., Inc., Garwood, N. J., as assistant sales manager. Mr. Blount left Magnus in 1937 and has more recently been with Red Star Yeast and Products Company where, for the past

Dave Blount

five years, he has held the post of bakery sales manager.

Extensive trade relation activities and frequent convention program appearances have made Mr. Blount a familiar figure in the baking industry.

W.C.C. Research Department Holds Seminar

The 61 technically trained staff members of the Wyandotte Chemicals Research Department recently held a three session seminar at the Detroit Book-Cadillac Hotel. One session was devoted to scientific activities within the department and one to corporation and management topics. At the dinner meeting, Walter J. Murphy, Washington, D. C., and editor of the American Chemical Society, reported on his tour of German chemical plants shortly after V-E Day.

An incidental part of the technical discussion was the disclosure that the Spectro-Chemical laboratory of the Wyandotte organization is able to make electron microscopic measurements of 1/100 of a micron, or 1/2,500,000 of an inch. The electron microscope and other spectrographic equipment is regularly used by the Wyandotte laboratories in both control and development activities.

Technical papers presented by eight staff members of the department treated of problems prevalent in the several industries served by Wyandotte Chemicals with its various compounds and organic and inorganic chemicals. These papers covered a wide range of subjects, including "Application of Physical Techniques to Chemical Research," "Synergism," "Current Trends in Chemical Patents," and "Synthesis and Evaluation of Mildewproofing Agents."

Ferro Opens Detroit Office

The Ferro Enamel Corp., Cleveland, Ohio, manufacturer of porcelain enamel finishes and designers of porcelain enameling equipment, announces the opening of a Detroit office to better serve its customers in that territory. The new office is located in the Ford Building and is in charge of Sylvester N. Smith, recently appointed Detroit district manager of Ferro Enamel Corporation. Prior to the war, Mr. Smith was a representative for the company in the Chicago district.

W.C.C. Research Department Supervisors: (left to right) W. R. Day, patent; Dr. L. R. Bacon, cleaning and sanitation; E. F. Hill, inorganic; A. W. Liger, industrial; Dr. T. H. Vaughn, director of research; Dr. D. R. Jackson, organic; C. F. Graham, analytical; Dr. W. F. Waldeck, chemical engineering; Dr. P. E. Burchfield, chemical engineering

For Top Standards in Finishing and Baking Efficiency

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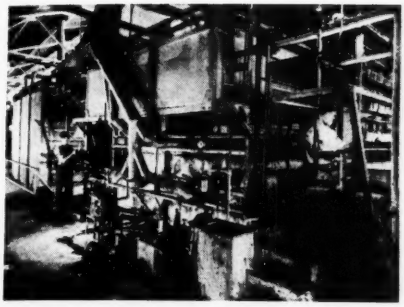
ENGINEERING IS YOUR ANSWER IN BETTER

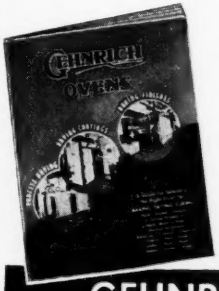
CLEANING MACHINES
RUST-PROOFING MACHINES
SPRAY BOOTHS • DIP TANKS
BAKING OVENS
HANDLING SYSTEMS



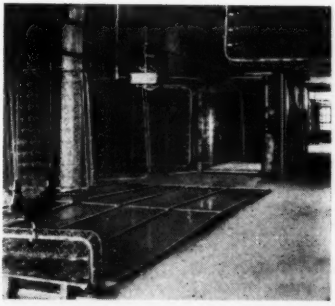
Gehnrich automatic, completely conveyorized system for washing, rinsing, drying, dipping in enamel, draining, recirculation baking and cooling of hardware pieces, with loading and unloading by one man at one station.

Whatever your organic finishing or baking problem, you'll do well to depend on Gehnrich engineering for the complete mechanical and processing layout—everything from cleaning to finish baking.

The use of Gehnrich equipment is assurance of quality production, insurance against processing troubles.



Monorail conveyor removing bed springs from enamel dip tank, over draining pan, into gas-fired, recirculation-heated baking oven.



WRITE FOR THIS CATALOG.

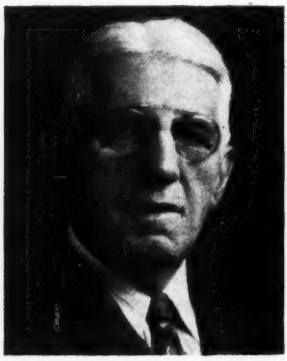
GEHNRICH OVEN DIVISION W. S. ROCKWELL COMPANY

Cleaning • Bonderizing • Spraying • Dipping • Oven Equipment

230 ELIOT STREET • FAIRFIELD, CONN.

Elected Director of Sun Chemical

A. C. Horn, former president of the A. C. Horn Company and founder of the



A. C. Horn

company in 1897, has been elected a director of the Sun Chemical Corporation of which the Horn Company is now a division.

Comprising the Sun Chemical Corporation are 27 nationally-known companies in the field of oils, resins, and pigments.

E. H. Christ Heads New Firm

Formation of a $200,000 corporation to manufacture and sell specialized industrial coatings, lacquers, and technical finishes was completed recently by Edward H. Christ of New Britain, Connecticut. At the same time, Mr. Christ announced his resignation as vice president, general sales manager, and a director of the Stanley Chemical Company.

The new company will be known as the Chemical Coating Corporation with general offices in New Britain. A new plant to manufacture the materials has been planned for this locality immediately.

Officers elected at the incorporation meeting were: president, Edward H. Christ; vice presidents, S. K. Hopkins, Montclair, N. J. and Edward D. Sechrest, Wellesley Hills, Mass.; secretary and treasurer, John J. Banninga, Rutherford, N. J. Directors will be the officers and Frank J. Wachter, former vice president of Landers, Frary & Clark, and J. Lindsay Muir, both of New Britain.

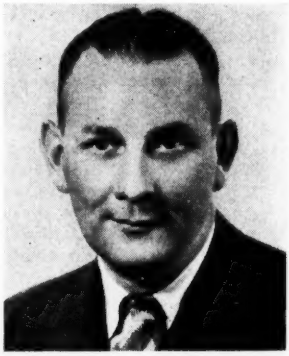
Mr. Christ was educated at Renssalaer Polytechnic Institute and was for four years Connecticut representative of A. P. Munning & Co., Matawan, N. J. For the past 20 years, he has been with the Stanley Chemical Company.

Promotions Announced

The promotion of five executives associated with the Pittsburgh Plate Glass Company is announced by E. D. Peck, general paint manager of the company.

Joseph G. Thompson, Jr., has been advanced to the position of assistant general paint manager. Since 1940, he has been associated with the company at its Milwaukee plant as supervisor of trade sales development. Mr. Thompson graduated from Johns-Hopkins University at Baltimore in 1922 with a degree of Bachelor of Science in chemistry. Two years later he attained his master's degree from the same school.

Fergus A. O'Connor, formerly supervisor of maintenance-painter sales, has been appointed supervisor of dealer sales. Mr. O'Connor has been associated with the company for 23 years, first as an industrial paint salesman in the St. Louis territory. Later, he moved to Mil-



Joseph G. Thompson, Jr.

waukee as assistant to the paint advertising manager.

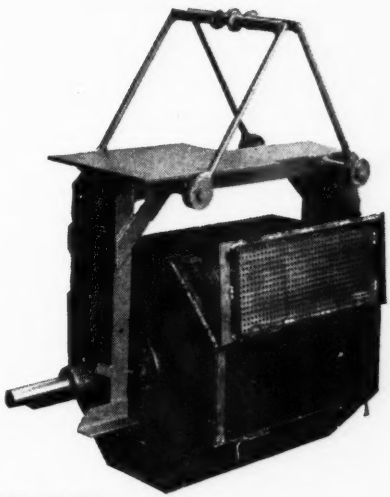
Nelson A. Mason, formerly supervisor of automotive, aircraft and graphic arts sales, is now supervisor of maintenance-

ROLOCK

PROCESSING CARRIERS

As an economy measure, this Rolock-designed Rotating Barrel, built to stand on the edge of tanks with barrel extending into the liquid, utilizes Monel only where necessary. Frame and bearings are acid resistant painted to avoid rusting. Large loads of small parts are pickled evenly by means of a motor-driven sprocket chain drive to the barrel.

This is a good example of how baskets, trays, crates, racks and fixtures made to fit individual needs in handling metal parts speed work, save manpower and minimize rejects. Rolock carriers are custom-built to best withstand temperatures, acids, abrasion . . . resulting in more hours of service life.



CATALOG ON REQUEST

ROLOCK, INC.

1400 Kings Highway East, Fairfield, Conn.

painter sales. Mr. Mason has been associated with the company in various positions since 1927. He is a graduate of the University of Texas, class of 1924.

Returning to the company after three years of service with the Navy, Leonard

Kenneth E. Whitekettle

W. McGarity has been appointed supervisor of paint department sales to the company's stores. A graduate of the University of Alabama, Mr. McGarity served as manager of the company's Montgomery, Ala., unit for 2½ years prior to his Navy service.

Now on terminal leave as a captain in the Army Air Corps, Kenneth E. Whitekettle has been appointed supervisor of brush sales. He served for 3 years in Africa and England as an air combat officer with the Eighth Air Force. A graduate of the University of Pittsburgh, class of 1929, Mr. Whitekettle was paint manager of the company's New Orleans warehouse prior to his commissioning in the Army.

All five men will be located in the Pittsburgh Plate Glass Company's general offices in the Grant Building, Pittsburgh, Pennsylvania.

Pennsalt Moves Kress to Cleveland

Robert W. Kress of the Special Chemicals Division, Pennsylvania Salt Manufacturing Company, has been promoted from assistant to Joseph W. Manz, senior sales serviceman in Chicago, to senior sales serviceman of the Northern Ohio area. He will make his headquarters in Cleveland.

Opens New Office

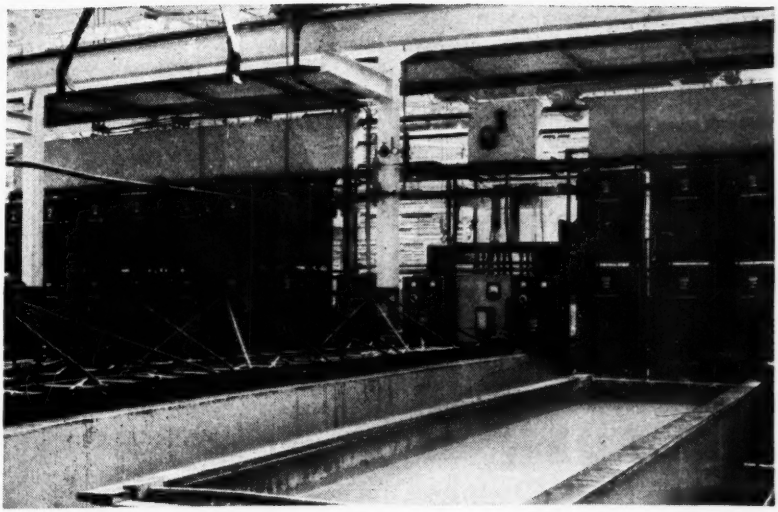
The Crane Equipment and Supply Co., Waterbury, Conn., announces the opening of an office in Providence, R. I., located at 1122 Hospital Trust Bldg. This office will be under the management of Raymond L. Mitchell who is well known in this territory, having served for several years as field engineer for Detrex Corporation on metal-cleaning problems. Mr. Mitchell is a member of the Providence-Attleboro Chapter of the American Electroplaters' Society.

The company will specialize in the solvents degreasing field, representating the Mechanical Process Company, manufacturer of D'Oiler manual and automatic degreasing machines. Tromex (trichlorethylene) and perchlorethylene (Westvaco Chlorine Products Corporation), both widely used in metal degreasing, will be stocked in the company's Providence warehouse. Another featured service will include the recovery of waste solvents and thinners used for washing and stripping purposes. For a number of years, the company has acted as New England

Raymond L. Mitchell

representative for the Solvents Recovery Service, Inc., Newark, New Jersey.

A recently established plant at Waterbury is now in a position to offer a complete plating rack service, including designing, building and insulating.



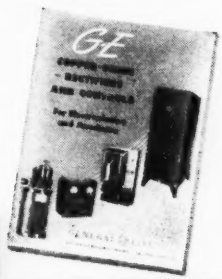
FOR A FLEXIBLE PLATING POWER SUPPLY USE *G-E* RECTIFIERS...

Equip your plating shop with G-E Copper-oxide Rectifiers. It's a sure way to eliminate the expense, costly delays and shutdowns which so often result when production needs change.

They Help You Save Five Ways:

1. G-E COPPER-OXIDE PLATING RECTIFIERS offer a decentralized power source that can be shifted easily and quickly to the exact spot required for peak operating efficiency.
2. G-E COPPER-OXIDE PLATING RECTIFIERS can be arranged in parallel, series or series-parallel for a wide range of voltage and current requirements.
3. G-E COPPER-OXIDE PLATING RECTIFIERS supply transmission control of a-c input instead of resistance control in d-c output. This cuts current cost to the minimum.
4. G-E COPPER-OXIDE PLATING RECTIFIERS are easy to install. They require no special foundation or expensive installation accessories.
5. G-E COPPER-OXIDE PLATING RECTIFIERS have no moving parts other than a ventilating fan which requires occasional lubrication. Hence, maintenance costs compared with other types of plating power equipment are negligible.

Investigate how G-E Copper-oxide Rectifiers can help you realize economies in your plating and anodizing establishments. Write to Section A465-70, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn. Ask for a copy of our catalog entitled, "G-E Copper-oxide Plating Rectifiers and Controls."



GENERAL ELECTRIC

Cartwright Appointed Manager

The Jones-Dabney Company announces that L. V. Cartwright, vice president, has been appointed manager of its Resin and Grinding Liquids Division. A native of Ohio, Mr. Cartwright entered the paint industry many years ago and his background of experience well qualifies him for this important post. He will be assisted by an able and experienced staff.

Mr. Cartwright succeeds E. J. Probeck, one of the founders of the Jones-Dabney Company, who, due to ill health, will now serve in an advisory capacity to the Resin and Grinding Liquids Division.

Ehret Joins Electric Products

The Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio, announces

Robert H. Ehret

the addition of Robert H. Ehret to the headquarters sales staff. He will be responsible for handling headquarters sales negotiations.

Mr. Ehret brings to his new position a broad experience in electrical sales and engineering gained from 1½ years of training with the General Electric Company and Electric Machinery Manufacturing Company, plus 11 years of selling, applying, and installing apparatus manufactured by the Burke Electric Company.

Made Superintendent

The Optimus Equipment Co., Matawan, N. J., engineer and manufacturer of metal washing and drying equipment, announces the appointment of Grover C. Schantz as production superintendent. Mr. Schantz was previously plant superintendent at the Metalwash Machinery Co., Irvington, N. J. Prior to that, he managed his own machine shop for several years, preceded by his holding the position of assistant master mechanic at the John A. Roebling Sons Co., Trenton.

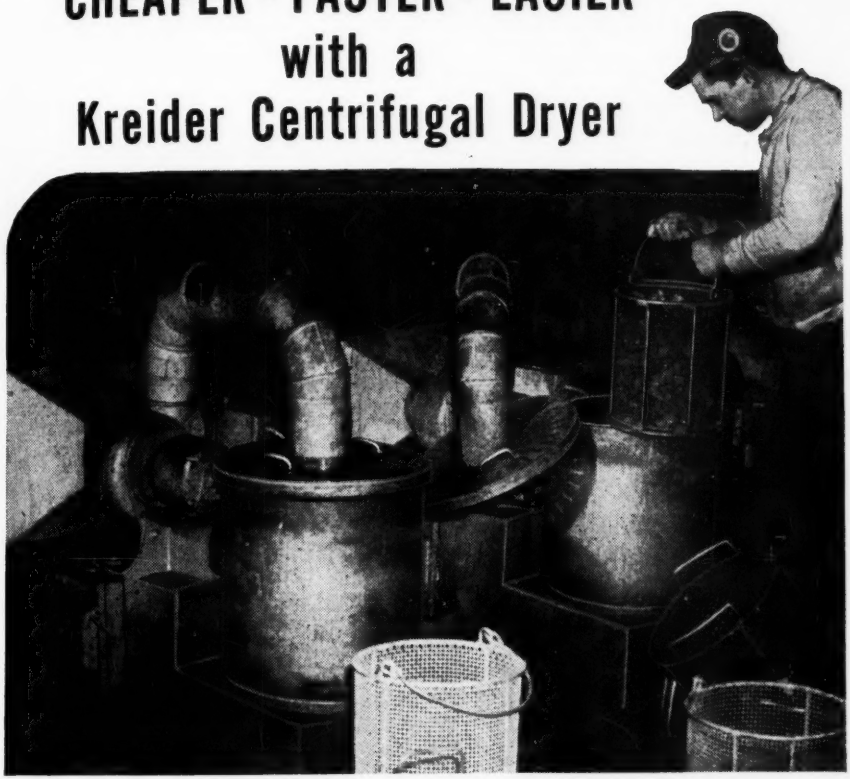
Grover C. Schantz

Technical Sales Representative

The management of Apothecaries Hall Co., Waterbury, Conn., manufacturer and distributor of industrial chemicals, plating supplies and equipment, an-

Frederick S. Foster

Dry Small Parts CHEAPER • FASTER • EASIER with a Kreider Centrifugal Dryer



FASTER DRYING, more uniform finish, lower operating costs—these are the proven results of a Kreider Centrifugal Dryer. This modern, economical machine dries a basket of small parts *in only 35 seconds.* Even the smallest parts are dried evenly and thoroughly with improved surface lustre. Easy to operate, one workman can readily handle the foolproof reversing drum switch and foot brake. The Kreider Dryer is available with or without heating unit.

Send for complete information and prices.

KREIDER *Centrifugal* DRYER

DELLINGER MANUFACTURING COMPANY

729 N. Prince Street **Lancaster, Pa.**

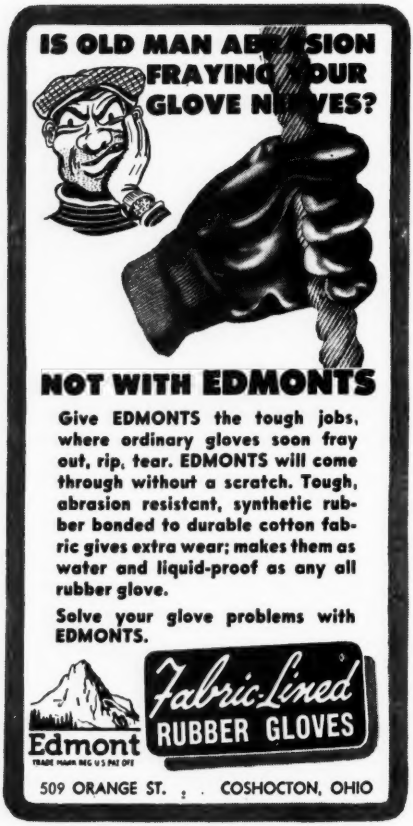
nounces the appointment of Frederick S. Foster as technical sales representative.

Mr. Foster has been with the Apothecaries Hall Company since July 1934. He started work in the laboratory as one of the company's analytical chemists and sometime later was transferred to the sales department. His training and experience in laboratory research, combined with a well-rounded practical knowledge of plating and finishing, make him especially well qualified for technical sales service work.

Forms Company

Robert L. Buckley has resigned his position as consulting chemist and plating engineer of the E. R. Frost Co., Minneapolis, Minn., and formed the Industrial Chemical and Equipment Co., 318 Builders Exchange, Minneapolis, Minnesota.

Mr. Buckley has studied chemistry in the Twin Cities and entered the chemical electroplating field with the Cornelius Company, Minneapolis. The new company will serve as sales representatives for manufacturers of electroplating and chemical processing equipment and supplies. Mr. Buckley is secretary-treasurer of the Twin City Branch of the American Electroplaters' Society.


IS OLD MAN AB SION
FRAYING OUR
GLOVE N VES?
NOT WITH EDMONTS
Give EDMONTS the tough jobs, where ordinary gloves soon fray out, rip, tear. EDMONTS will come through without a scratch. Tough, abrasion resistant, synthetic rubber bonded to durable cotton fabric gives extra wear; makes them as water and liquid-proof as any all rubber glove.
Solve your glove problems with EDMONTS.
Edmont
Fabric-Lined
RUBBER GLOVES
509 ORANGE ST. COSHOCTON, OHIO

Martin J. Monahan Named Technical Director

Martin J. Monahan has been named technical director of all trade sales divisions of the American-Marietta Company, according to an announcement by Grover M. Hermann, president. A member of the technical staff since 1929, Mr. Monahan will be responsible for the coordination and standardization of the trade sales items of the various A-M plants.

Located at the Kankakee, Illinois plant, Mr. Monahan is a graduate of Newark Engineering College, receiving his B.S. degree in chemical engineering in 1926 and his Ch.E. degree in 1928.

Assistant Sales Director Named

Frank G. Oswald has been appointed assistant sales direct of the Synthetics Department of the Hercules Powder Company, according to an announcement made by Dr. W. M. Billing, general manager of the department. He will assist in general sales policies, sales training, and in co-ordination of technical sales activities.

The department is establishing a new group to handle the market development of new products, with Malcolm C. Moore as manager and J. Glenn Little as assistant manager. Others assigned to the group are Paul Johnstone and James Monkman.

Mr. Oswald has been manager of the Synthetics Department technical service division which is being discontinued in order to broaden sales activities of the department. He will continue to handle technical problems.

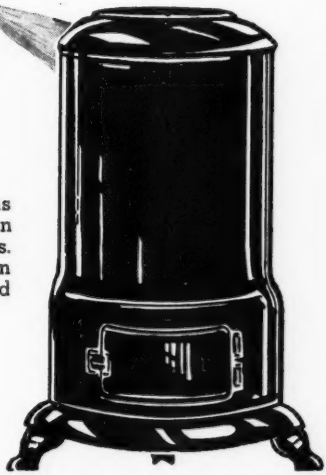
INVESTIGATE

SILCO

GLASS-BASE PROTECTIVE SPRAY COAT

The Result Will Surprise You!

In color, texture and durability, SILCO stands alone. As a finish for steel and brass, its usefulness is beyond calculation! Though sprayed on, when baked it takes on the hardness of *glass!*



SILCO withstands heat up to 1000° F., is impervious to dampness and corroding gases, has high abrasion resistance. All colors, two pleasing eggshell finishes. Easy to work. Spray it on and dry at 200° F., then bake in any industrial oven at 350° F. Sample and details on request.

BLACK-MAGIC

DEEP PENETRATING 1-BATH OXIDE BLACK FOR STEEL AND IRON

This single bath gives iron and all steels except stainless a dense, permanent black that won't rub off (penetration .0001"). Very flexible; product may be formed after processing. Also an effective rust inhibitor and a fine paint and lacquer bond. Chemical reaction at 300° F. There are also BLACK-MAGIC baths for zinc, copper, brass and cadmium. Sample and details on request.

MITCHELL-BRADFORD CHEMICAL COMPANY

MODERN METAL FINISHES

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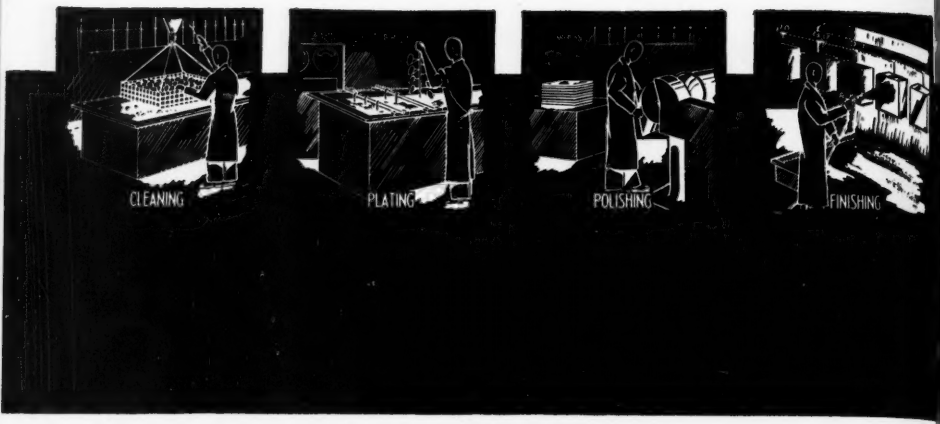
BLACK-MAGIC OXIDE BLACKING SALTS
WITCH-DIP & WITCH-OIL FINAL FINISHES

SILCO *Glass-Base* PROTECTIVE COATING
HEAT TREATING SALTS. CLEANERS. ETC.

N. Y. CITY: Lacquer Finishing, Delawanna, N. J.
CLEVELAND: Universal Paint & Varnish Co. — PHILA.: Albert Printz, Germantown
INDIANAPOLIS: R. E. Stovall & Associates — ST. LOUIS: G. S. Robins & Co.
LOS ANGELES: Barber-Webb Co. — OAKLAND: Geo. A. Kushman Co.
CANADA: Marine Power, Ltd.



Udylite Automatic Filter

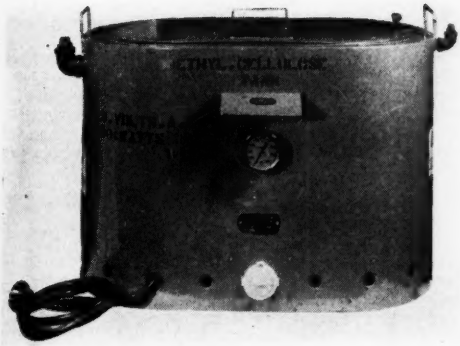
An automatic filter for plating room service is announced by The Udylite Corp., 1651 E. Grand Blvd., Detroit 11, Mich. Designed for either continuous or intermittent filtering, the unit, according to the manufacturer, serves to filter or transfer plating solutions easily and quickly without spilling any of the liquid and requires no replacement parts. In addition, it can be cleaned without the use of a single tool.

The heart of the Udylite Automatic Filter is a specially designed positive plug type multi-port valve having only one operating control lever. By manipulating this lever, the operator can prime the pump, feed slurry, backwash, build filter cake, clean the filter, or transfer a solution from one tank to another. Suction and discharge lines need not be changed at any time after filtering has begun, it is stated.

The filtering medium (activated carbon, diatomaceous earth or fiberous material) is mixed with water or plating solution in the slurry tank and transferred by the pump to the filtering tank. The filter structure consists of rigid porous ceramic elements arranged radially with a central panel to carry the filtrate. These filtering elements are permanent and need not be removed. The filter aid is deposited on the outside of the elements to form the filter cake. At any time during the filtering operation, filter aid can be added without interrupting the operation.

The entire unit is fully enclosed and is said to be easy to keep clean. It is also readily portable, having truck wheels large enough and with sufficient tread to roll over duck boards easily.

Udylite Automatic Filter



Cooper Plastic Dip Tank

Cooper Plastic Dip Tank

The D. C. Cooper Co., 1467 S. Michigan Ave., Chicago 5, Ill., announces an oil jacketed tank for heating ethyl-cellulose (plastic) compounds in which precision tools are dipped for protection against rust, corrosion, and breakage. These compounds require a dipping temperature of 385 deg. F. and an accurate temperature must be maintained throughout the dipping bath.

The Cooper Plastic Dip Tank is electrically heated, thermostatically controlled, and equipped with a stainless steel thermometer. The jacketed portion contains a special heat transfer oil to ensure even temperature throughout the bath and thereby eliminate cold spots. An intake and drain for the heat transfer oil and a drain for the plastic bath are provided in the tank, which is heavily insulated and has an insulated lid.

The Cooper Plastic Dip Tank has inside dimensions of 22 inches long x 10 inches wide x 10 inches deep and can be used for the plastic dipping of spark plugs, gears, fittings, springs, locks, bushings, machine parts, and precision tools. When parts are ready for use, the plastic coating is simply peeled off and the peeled-off coating can be remelted in the tank for further use.

Cardox "Transitank" Fire Extinguishing Unit

Known as the "Transitank," a portable fire extinguishing unit with a capacity of 750 lb. of liquid carbon dioxide is now being marketed by the Cardox Corp., Bell Bldg., Chicago 1, Ill. A feature of the unit is its extremely high application rate of 300 lb. of carbon dioxide per minute from a single nozzle.

In the Transitank, liquid carbon dioxide is stored in a refrigerated and insulated pressure vessel at a constant temperature of approximately 0 deg. F. and 300 lb. per square inch pressure. At this temperature, the liquid carbon dioxide yields 47 per cent CO_2 "snow" (finely divided particles of dry ice) when released. This high yield of CO_2 snow provides for an increased cooling effect and unusually effective projection by means of a patented "Snow-Separation" nozzle. By concentrating the CO_2 snow in one portion of the carbon dioxide discharge, the snow's dense mass can be directed into the heart of the fire through relatively great distances in the presence

Cardox "Transitank" Fire Extinguishing Unit

of strong air currents. As controlled and applied, the carbon dioxide is described as having uniform discharge and extinguishing characeristics and is said to be non-damaging and non-contaminating.

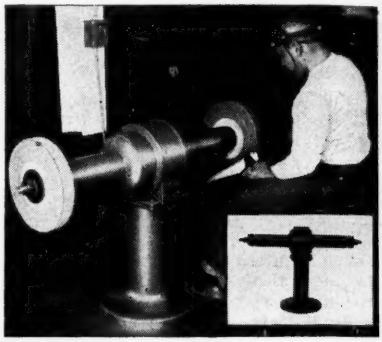
Said to be ideal for protection against hazards involving volatile flammable liquid storage and handling, mixing or processing operations, electrical equipment, spraying, and so on, the Transitank is manufactured in three types—an all-purpose indoor-outdoor unit equipped with pneumatic tires, which may be either hand propelled or attached by its trailer hitch to any industrial power truck; a steel caster unit designed for extreme maneuverability and close clearances indoors; and a motorized unit for industries and operations requiring fire extinguishing equipment capable of traveling comparatively great distances quickly. Each type is equipped with the Snow-Separator nozzle, 50 feet of hose, and squeeze valve that affords instant control of the carbon dioxide discharge. Refilling of the Transitank is effected by means of Cardox transport trucks, with the liquid carbon dioxide pumped into the unit directly from the truck.

Hobart Blacksmith Buffer and Grinder

A low pedestal type buffer and grinder designed especially for use in blacksmith shops for the grinding and buffing of plowshares and other long odd-shaped pieces has been brought out by the Hobart Brothers Co., Motor Generator Division, Hobart Square, Troy, Ohio. The unit is also adaptable to a wide variety of other shops for numerous buffing and grinding jobs.

Over 40 inches of working space are provided between the wheels of the machine, and the low design of the pedestal enables the operator to sit at the machine and brace the workpiece between his protected knee and the buffing wheel so as to assure sufficient pressure against the buffing wheel to produce a very smooth finish. The grinder is fabricated from steel sheets rolled and electrically welded, thus ensuring lightweight together with sturdy construction. The ball bearings and smooth-operating long-life nonstalling motor are fully enclosed. The strong, durable shaft and motor are well balanced and are supported on three heavy duty ball bearings with a minimum of vibration.

Where single phase current is employ-



Hobart Blacksmith Buffer and Grinder

For:

1. **Oxidizing and Stripping Copper Plate.**
2. **Stripping Tin.**

Use:

McKeon's Liquid Sulphur

McKeon's Tin-Strip

Information or Samples on Request.

SULPHUR PRODUCTS CO. Greensburg, Pa.

If SURFACE PROTECTION is Your Problem

...You'll Want This Free ILLUSTRATED BULLETIN

THIS descriptive bulletin on Pen-Kote 500 points the way to *greater speed and economy* in protecting ALL surfaces against acids, alkalis and moisture.

Illustrations of typical jobs show how readily this quick-drying, odorless maintenance paint is applied—even to heated, wet or porous surfaces. Unretouched photos of comparative test strips demonstrate the superior protection provided by a *single coat* of Pen-Kote 500; and other distinctive advantages are explained in detail.

The many unusual features offered only by Pen-Kote 500 add up to perfect, extra-durable protection under the most adverse conditions . . . at much less labor cost . . . without health or fire hazard . . . and without shutdown of plant or equipment. The bulletin gives complete information; write for your copy today!

Pen-Kote PRODUCTS

PENINSULAR CHEMICAL PRODUCTS CO.
6795 EAST NINE MILE ROAD
VAN DYKE • MICHIGAN

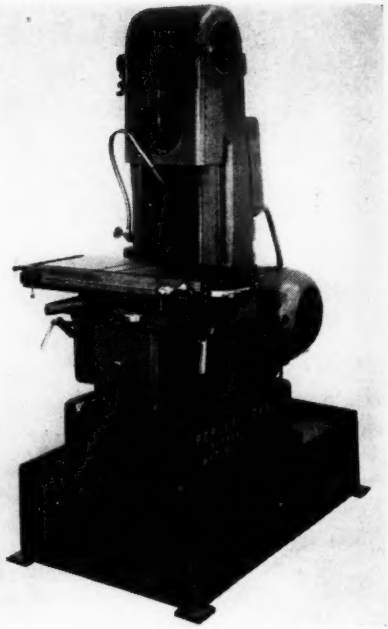
ed, the Hobart Blacksmith Buffer and Grinder is available with a 3 h.p. motor of the repulsion-induction type. Where three-phase current is employed, the unit can be obtained with a 3 h.p. motor of the squirrel-cage induction type. Each type of motor uses current only in proportion to the load and is of the non-stalling type so that it will not slow down under rated load, it is claimed. Moreover, each type of motor can be safely operated at a maximum speed of 1,750 r.p.m. The starting switch is located on the pedestal of the machine directly under the motor where it is within easy reach of the hand or knee of the operator.

Porter-Cable Model BG-8 Welt Bet Surfacer

An improved wet belt surfacer incorporating features which provide for increased output has been announced by the Porter-Cable Machine Co., Syracuse 8, N. Y. Designated as the Model BG-8, the machine is equipped with a large capacity recirculating tank for long operational performance. The coolant, applied to work and belt with a spray nozzle, maintains the work in a constantly cool condition and prevents weakening of the structure of such materials as plastics, rubber, ceramics, glass, and tempered metals, it is claimed.

The depth of the machine has been reduced from 62½ to 48 inches to conserve space. The work table of the BG-8 is 38 inches from the floor in contrast to the previous distance of 40½ inches.

The heavy base of the BG-8 is constructed to provide rigid support to the work table and the automatic feed table. A flat, hardened steel platen is used to back the belt during the grinding operation. The standard platen measures 9 x 12 inches and the working area of the standard table is 17½ x 11¼ inches. An abrasive belt 8 or 9 inches wide x 107 inches in circumference can be used. Moreover, resilient platens can be used on the Model BG-8. Such platens are used when the surface to be ground need not be perfectly flat or parallel with other surfaces. They are also used when surfacing or grinding concave or convex surfaces.



Porter-Cable Model BG-8 Wet Belt Surfacer

WRITE FOR SAMPLES — TRY THEM OUT

POLISHING COMPOUNDS

4A Polishing Compounds give a high lustre to all kinds of iron and steel, nickel, chrome and hard-to-buff alloys.

Write today for a sample.

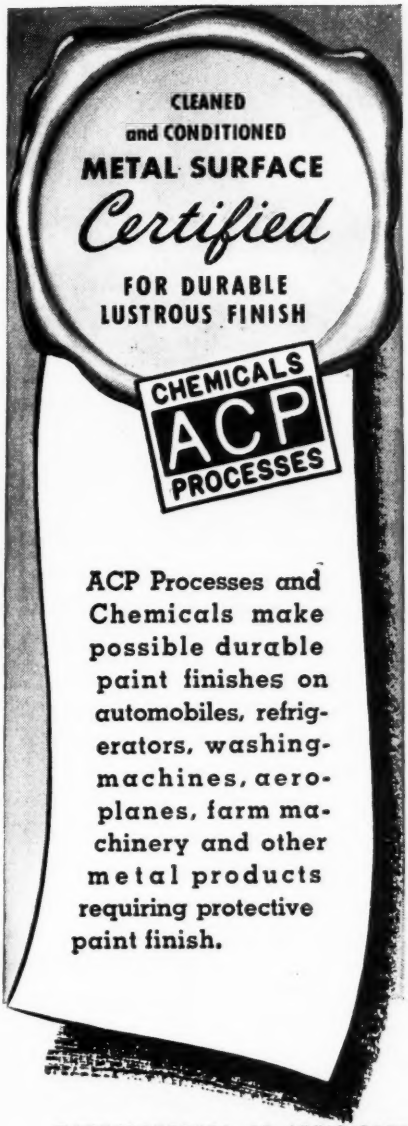
CEMENT AND THINNER

4A Cement and Thinner is a substitute for glue used on belts, rolls, wheels, etc. Try it out in your own shop.

Write today for a sample.

4A

HARRISON & CO. POLISHING COMPOUNDS CEMENT AND THINNER HAVERHILL, MASS.



EACH of the following American Chemical Paint Co. products excels in the special application for which it was developed—all prepare metal surfaces for durable finishes:

COLD SPRAY-GRANODINE produces a dense smooth phosphate coating that protects steel and paint for a durable, lustrous paint finish.

THERMOIL-GRANODINE creates a heavy coating of iron and manganese phosphate which when oiled retards corrosion and prevents excessive wear on friction surfaces. When painted provides unusual protection.

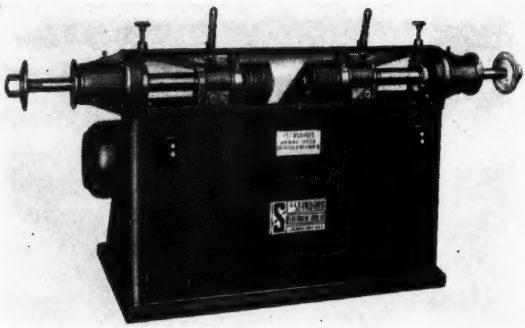
210 B DEOXIDINE assures proper cleaning and a thin, tight and relatively hard phosphate coating so essential to a bright enduring paint finish.

DEOXIDINES—There are other Deoxidines that remove rust, clean and condition for painting.

LITHOFORM—a phosphate coating that bonds paint to galvanized, zinc or cadmium coated surfaces.

MANUFACTURERS OF INHIBITORS AND METAL WORKING CHEMICALS

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP PENNA.



"Standard" Extra Heavy Duty Buffing and Polishing Machine

Additional specifications of the machine are as follows: automatic feed table working area, 11¼ x 24½ inches; abrasive belt speeds, 4,100 s.f.p.m. standard, 2,500, 3,550 or 4,600 s.f.p.m. optional; motor speed, 1,725 r.p.m.; drive unit, 5 h.p. 220/440, 60 cycle, 3 phase (7½ h.p. motor optional); shipping weight, 2,060 lb. with automatic feed table.

"Standard" Extra Heavy Duty Buffing and Polishing Machine

The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio, announces an extra heavy duty (20 or 30 h.p.) buffing and polishing machine, designed primarily for the hard production service required in producing automobile bumpers and also useful for other types of work such as kitchen utensils, agricultural implements, and so on.

Each side of machine is independent of the other, thus permitting one operator, if desired, to work at a speed differing from that of the other side of the machine. Or, when necessary, one spindle can be shut down without interfering with the operation of the other side. Each spindle has its own 10 or 15 h.p., 1,800 r.p.m., totally enclosed, fan cooled, ball bearing motor; magnetic starter; push-button station; hand brake for quickly stopping the spindle, and shaft lock for use in changing wheels. In addition, means are provided for adjusting the tension on the mulitple V-belt drive.

Each spindle assembly is equipped with three oversize ball bearings protected in liberal size oil reservoirs, with sight feed oil gage on each bearing housing. The diameter of the spindles between flanges is 2 inches, and the spindles have Acme threads and hard bronze nuts. The distance between wheel flanges is 9 inches, while the distance from the base to the inside of each wheel is 8 inches. The base measurement of the machine is 36 x 60 inches, and the net weight, 2,930 pounds.

Spindle speed is optional and for special applications, such as the production of farm implements, the distance from the floor to the center of each spindle can be 47 inches or some other suitable measurement. The machine illustrated measures 39 inches from the base to the center of each spindle.

YOUR FINELY MACHINED PARTS DESERVE THIS PROTECTION . . .

Cost no more than makeshifts, when you count time lost, looking for makeshifts.

PRECISION DUST CAPS AND THREAD PROTECTORS

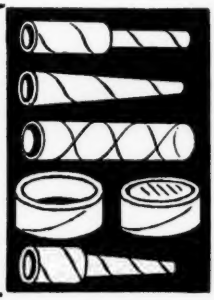
Tough fibre. Absolutely keep out moisture, rust, dust, grit, externally or internally. Shapes to every requirement.

Send for Bulletin and low prices.

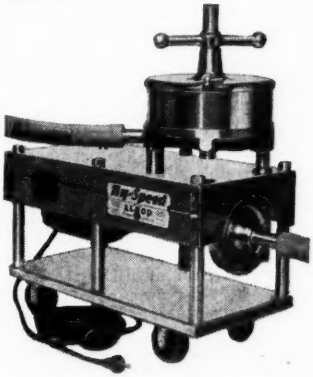
PRECISION PAPER TUBE CO.

2053 W. Charleston St., Chicago 47

Mfrs. of Paper Tubes, Bobbins, Spools, etc.



Alsop's New "SEALED-DISC" FILTERS for your electroplating work



• Consider the remarkable features that have already made Alsop Filtration so successful on practically all types of solutions and in high speed or still tank installations.

It's no wonder so many platers (our users) say, "The Alsop Sealed-Disc filter has all we want and more." You, too, can use the "Sealed-Disc" filter for the same positive, trouble-free plating.

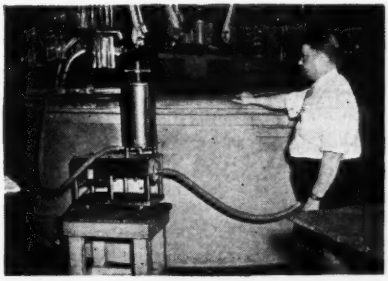
Our Engineering Service plus our Laboratory facilities have been very helpful to many of our customers. Perhaps we can help you, too. We'd like to try. Just write us giving details of solutions to be filtered, there's no obligation.

ALSOP
ENGINEERING CORPORATION
Filters · Filter Discs & Sheets · Mixers · Agitators
104 KEEN STREET MILLDALE, CONNECTICUT

Check✓ THESE FEATURES

Alsop's New "Sealed-Disc" Filter offers many advantages, including these:

1. Completely enclosed, air-tight unit, eliminating loss through leakage or dripping.
2. Exceptionally small space requirement. For example, a 600 gals. per hour filter complete with pump and motor requires only a 9"x20" floor space; a 2000 gals. per hour machine requires only 12"x24" of floor space.
3. Filter discs can be changed quickly and easily even when changing from one solution to another. Anyone can do it in a very few minutes.
4. Made in sizes, with or without pumps, from 1 gallon per minute up to thousands of gallons per hour.



This 600 gals. per hour filter effectively keeps an automatic plating tank free from dirt, dust and other impurities. Several of these filters can be used on different stages or solutions including the cleaner for certain types of work.

"Dustkop" Model 421 Dust Collector

Unusual portability for a completely self-contained dust collector, which requires no installation other than the mere placing of the unit in position on the bench and plugging into the lighting circuit, is a feature of the newest addition to the line of "Dustkop" industrial dust collectors offered by the Aget-Detroit Co., 602 First National Bldg., Ann Arbor, Mich. In addition to the customary motor-driven fan, cyclone separator, and filter, the unit, which is designated as the Model 421, incorporates a grinding wheel hood which is built as an integral part of the unit.

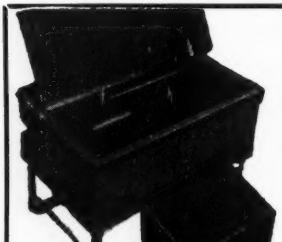
"Dustkop" Model 421 Dust Collector

Though designed primarily for bench-type dry grinding of a precision nature, the dust collector has, due to its design, a wider range of uses. Buffing, polishing, and similar work which produces great amounts of long stringy material, lint, bristles, and so on, can be easily handled, it is claimed, since the unit is equipped with a self-clearing paddle wheel fan. A removable pan in the grinding wheel hood allows sludge from wet grinding operations to be emptied separately, thus keeping it out of the collector. A baffle plate in the hood prevents small work from being drawn by the air suction into the fan and at the same time spreads the effective area of the suction.

Where the Dustkop Model 421 is to be moved about, it is available with a 110-volt motor so that the electrical connection is made merely by plugging into the lighting circuit. However, the unit is available for operation on other voltages when required and where the installation is to be of a permanent nature.

Two stages of air cleaning are incorporated in the Model 421. The first stage, claimed to remove all of the heavier dust and dirt as well as lint, bristles, and so on, is afforded by means of the cyclone separator. The second stage comprises the fire-safe spun glass filter which gives the air a final cleaning to remove the finer particles of dust before the air is returned to the room.

Reclaiming precious metal dust is simply a matter of removing the collected dust from the unit and melting the finer particles out of the spun glass filter material, which is easily replaceable. Maintenance is chiefly a matter of turning a hand crank which shakes the finer particles out of the filter material when the latter loads up after long periods of use.



Quick, Efficient Metal Cleaning with

PERMAG Cleaning Compounds

Using Gas-fired Hot Liquid Dip Tank

Heetmaster Model 30T, 30 gallon capacity, two dipping baskets with each tank. Ideal for cleaning, degreasing, rustproofing, etc. Unequalled for small parts. *Write for details.*

MAGNUSON PRODUCTS CORPORATION
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In Canada: Canadian Permag Products, Ltd.,
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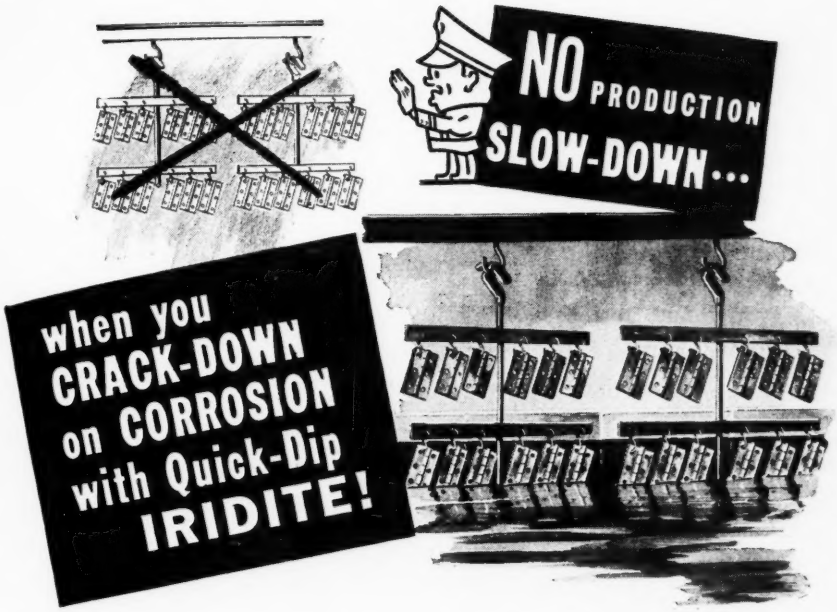


IRIDITE Provides Fast, Inexpensive Method of Protecting Zinc - Cadmium - Galvanizing

IRIDITE TEST-imonials

"Zinc, Iridited and painted, is possibly the last word in rust prevention as measured by extensive tests in salt spray, ammonia fumes, and various other deteriorating conditions found in structural installations."

JOSEPH B. CLAY,
President,
Clay Equipment Corp.,
Cedar Falls, Iowa.

Test that statement in *your* lab! Send for FREE TEST PANEL, half Iridited, half unprotected. See the difference. Write today.

IRIDITE licks corrosion in your products . . . boosts their sales appeal and your profits . . . without once slowing up your automatic production lines. Simply immerse your products in an IRIDITE solution . . . manually or automatically . . . on racks or in bulk . . . for 15 to 60 seconds . . . at normal shop temperatures. Dry them in a few seconds for immediate handling.

IRIDITE *unites chemically* with zinc or cadmium . . . won't flake, chip or peel . . . doesn't alter dimensions. Use IRIDITE as a final protective finish . . . as a paint base for permanent adhesion . . . in combination with zinc plating to replace more expensive materials. Available in olive drab, blue, green, red, bronze, black and transparent IRIDITE Bright. Send for free test panel offered on this page . . . and prove these facts yourself. Rheem Research Products, Inc., 1494 Standard Oil Bldg., St. Paul and Franklin Streets, Baltimore 2, Md.

RHEEM RESEARCH PRODUCTS, INC.
IRIDITE
Standard Oil Bldg., Baltimore 2, Md.

Magnus 755 Metal Parts Cleaner

Designed to effectively remove accumulated deposits of carbonized oil, grease, and dirt from metal parts, a cleaning material designated as Magnus 755 is now being marketed by the Magnus Chemical Co., Inc., Dept. PF, Garwood, N. J. For ordinary work, Magnus 755, used at room temperature, provides for a rapid "degreasing" action. Cleaning, however, can be speeded by heating the solution to 150 deg. Fahrenheit.

Safe for use on any kind of metal, Magnus 755, according to the manufacturer, will not attack aluminum alloys, babbitt bearing metal, solder, or any other soft metals. Fire hazard is said to be practically eliminated. In addition, the cleaner is described as non-corrosive to metals and non-injurious to leather or fiber gaskets.

Featuring long life, Magnus 755 Cleaner can be used over and over before it no longer provides for fast, thorough cleaning. Sludging is said to be slow since most of the dirt and grease deposits are actually removed in the rinse. When the tank does become sludged, the solution can be poured off, the sludge cleaned from the tank, and Magnus 755 poured back in the tank and reused.

Magnus 755 is also said to be an excellent stripper for removing coatings of paint, enamel, and lacquer down to the bare metal.

To reduce evaporation and dragout, the cleaner is recommended for use in a ratio of one gallon of water to four gallons of Magnus 755. Parts are soaked in this solution until deposits have been penetrated after which they are pressure spray rinsed with water or rinsed in safety solvent where the use of water on the parts is not desired.

For average garage use, Magnus 755 is optionally obtainable in a handy dip-tank container. The unit consists of four gallons of Magnus 755 in a five-gallon container (to allow addition of the water seal) and a sturdy, welded parts dipping basket.

Magnus 755 Metal Parts Cleaner Unit

SAVE DRYING *and* BAKING TIME
with
NALCO
Infra Red
LAMPS

The modern method that's thorough, speedy and clean. Clear glass and self-reflector, inside silvered lamps in units to fit the operation.
Send for bulletin "Drying Problems Made Easy."

North American Electric Lamp Co.
1020 Tyler St. **St. Louis 6, Mo.**

"Liquid Envelope" Peelable Plastic Film

"Liquid Envelope" is the trademarked name of a class of film-forming modified vinyl polymers having an "interlaced" molecular structure which is now being offered by Better Finishes & Coatings, Inc., 268 Doremus Ave., Newark 5, N. J. Carried in a volatile vehicle, these resinous compounds form extremely tough, elastic, impervious films that stick with any desired degree of adhesion, yet can be stripped off in sheets with little effort and no damage whatever to the underlying surface, it is claimed.

Liquid Envelope can be used in protecting polished sheet in transit and before forming; in the forming of stainless steel, Monel, cold rolled, brass, copper, aluminum or magnesium sheet; in protecting cutting tools in transit and in the tool crib; for the protection of parts in transit and in stockrooms; for "selective protec-

RACKS FOR DECORATIVE PLATING

Now a rack insulation made expressly for Copper-Nickel-Chrome cycle. BUNATOL No. 785 is very tough and flexible and has great air-dry adhesion to Copper or Brass racks . . . May we send you information?

NELSON J. QUINN COMPANY • TOLEDO 7, OHIO

tion" in production or assembly operations; to protect sub-assemblies in transit or in stock; and as a masking material during final assembly or finishing. Various formulations of Liquid Envelope are available for hot spray, cold spray, hot dip, cold dip, and brush application.

Easy to handle and apply, Liquid Envelope, according to the manufacturer, is

"Liquid Envelope" Peelable Plastic Film

relatively transparent and does not become opaque upon aging. It can, however, be supplied to form an opaque film in any solid or pastel color. Non-imflammable for all film formulations designed to retain flexibility above 0 deg. F., the product can be used to provide a film thickness from 0.002 to 0.050 inch which is not attacked at normal temperature by practically any strength alkalies or mineral acids, including aqua regia and hydrofluoric acid, it is stated. In addition, films are said to be completely insoluble in alcohols, greases, oils, and aliphatic hydrocarbons.

GOLD PLATING SOLUTIONS

In All Colors

Guaranteed 100% Pure Gold Content
Troy Weight - Color Constant
Tarnish Resistant
Proven Quality by the Acid Test

Write or call our experts about your plating problems

Davis-K-Products Co.
114 Lexington Ave., New York 16, N. Y.
Lexington 2-7360
2-5816

Harshaw Single Nickel Salts

Single nickel salts are now being produced as small definite crystals of carefully controlled size by The Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6, Ohio. These uniformly small $NiSO_4$-$6H_2O$ crystals are said to be the purest, highest nickel content nickel salts ever made by the company, and provide a large surface area. Solubility is described as rapid, with considerable time and trouble saved in preparing solutions.

When kept under reasonable storage conditions, Harshaw Single Nickel Salts are claimed to remain free flowing, lumping and caking being eliminated. The salts are supplied in strong five-ply paper bags which contain 100 lb. net and are easy to handle and convenient to stack.

Haveg "60"

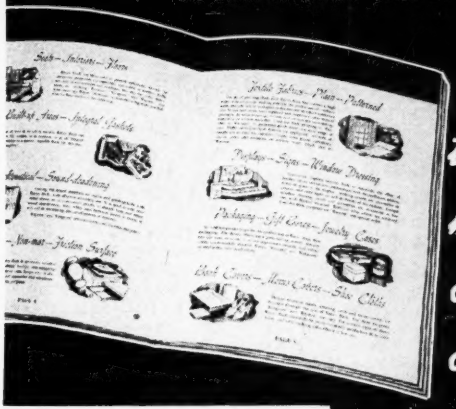
Developed to make use of the outstanding chemical and physical properties of the Furane resins, Haveg "60" now being marketed by the Haveg Corp., Newark 67, Del.. is said to be completely resistant to alkalies and to many solvents for which the other grades of Haveg cannot be used. Haveg 60 is described as tough, non-porous, and rigid and can be used at boiling temperatures. According to the manufacturer, it is not affected by rapid temperature changes, has low heat conductivity, and does not require lagging.

A non-conductor of electrical current, Haveg 60 may, it is claimed, be used in electrolytic installations without trouble from electrolysis or leakage. The material is said to be resistant to hot solutions of the strong bases, like caustic soda, even at high concentrations, and is also resistant to the weaker alkalies such as soda ash and ammonia.

In the case of solvents, Haveg 60 is said to be unusually resistant to acetone, chlorinated aromatics, aromatic and aliphatic hydrocarbons, and some of the Furanes. It is also claimed to have high resistance to aliphatic alcohols and aromatic alcohols. Its resistance to carbon tetrachloride and chloroform is excellent.

Haveg 60, the manufacturer states, can be used successfully with any concentration of hydrochloric, with sulphuric up to 50 per cent, phosphoric, sulphur dioxide, oxalic, tartaric, and most other acids even at their boiling points and even in the presence of chlorine. It is said to me particularly resistant to the acids of the aliphatic series.

Get this book: showing how Flock transforms any material to the appearance and feel of



SUEDE • VELVET • VELOUR
FELT • MOHAIR • CARPET

FUNCTIONAL USES

Used in the auto, airplane, radio, electrical, phonograph, ceramics, furniture and many other industries for

SOUND DEADENING • TEMPERATURE INSULATION • INTEGRAL GASKETS • SHOCK ABSORBING SURFACE • NON-MAR SURFACE • NON-GLARE SURFACE.

DECORATIVE USES

Applied in various lengths and colors to wood, paper, cloth, metal, etc., the following effects are produced

SUEDE LEATHER • FURNITURE UPHOLSTERY • INTERIOR AND DRAPERY FABRICS • VELVET • VELOUR • MOHAIR.

Rayco Flock makes possible the production of synthetic surfaces in the manner that synthetic yarns and plastics have replaced and improved upon other methods. Made in many types, lengths and colors, flock can be adhered to practically any material, either over-all or in selected areas, to produce the effects listed at the left. Call upon our engineering advice.

REQUEST ILLUSTRATED COLOR BOOK: "SURFACE COATING WITH FLOCK"

RAYON PROCESSING CO. of R.I. INC.

63 TREMONT ST., CENTRAL FALLS, RHODE ISLAND

Developers and Manufacturers of Printing and Coating Flock

Wyandotte 97 Paste in Steel Containers

Wyandotte 97 Paste—a cleaner for use on washroom fixtures, floors, and walls—is now available in full flush, lock top steel drums similar to that shown in the accompanying illustration. In addition, the handy and sturdy steel dispenser shown is also now available.

Wyandotte 97 Paste in Steel Containers

Wyandotte 97 Paste is described as a quick-acting and free-rinsing cleaner which is said to be ideal for "spot" cleaning soiled painted furniture, for removing marks from floors of all kinds, and for use by mechanics where hands become heavily soiled. According to the manufacturer, Wyandotte 97 Paste can be easily removed from either the small dispenser or the large drum. As an added protection. the interior of the dispenser is varnished. Both the steel dispenser and steel drum are equipped with lock tops.

Pink in color, Wyandotte 97 Paste is said to have a pleasant odor.

"Cotoid" Air-Drying Coating

An air-drying protective coating which is said to be highly resistant to acids, alkalies, chlorides, oils, brine, oxygen, gasoline, and alcohol solutions, to be known as "Cotoid," has been developed by the Lithgow Corp., 333 W. 40th Place, Chicago 9, Ill. Based on synthetic resin in which its low water absorption and inert properties inhibit corrosion, the coating, according to the manufacturer, provides a tough, hard, elastic finish which, after air or force drying, is tasteless and odorless. It has been found practicable for protecting walls, wood or steel structural work in processing plants, paper mills, and so on, and can be used for coating the inside and outside surfaces of concrete, steel, or wooden tanks used for corrosive solutions, brines, and alkalies.

Cotoid is designed to withstand a maximum temperature in air or vapor of 220 deg. F. Maximum submerged temperatures approach 150 deg. F., and the coating, it is claimed, will not crack under temperatures as low as 20 degrees below zero F. Application by spraying is recommended, however, the coating can also be applied by dipping, flowing, or roller coating. In addition, a specially prepared Cotoid for baking-on process is available. Cotoid is packaged in 1, 5, and 10-gallon cans and in 55-gallon drums.

Duraplex ND-77B Resin

Said to provide an improvement in the quality of finishes on refrigerators and washing machines, a resin to be known as Duraplex ND-77B has been developed

For a real good polishing job use

KEYSTONE EMERY

TURKISH — NAXOS — AMERICAN

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

SAFE HANDS WORK FASTER

with Steel-Grip Gloves

To cut costs, speed production. Keep materials moving with Steel-Grip Reinforced Gloves. They handle rough, heavy, jagged materials at breathless pace. Chrome tanned cowhide. Steel ribbon reinforced palm and fingers. Steel thread sewed. Or what's your need? Over 4300 proved Steel-Grip Safeguards may give immediate answer. Used by big industrials since 1910. Write for catalog or state your need *today*.

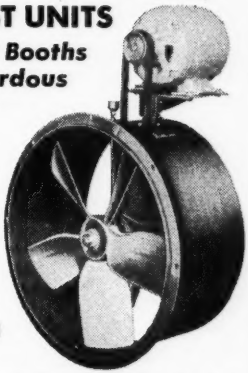
INDUSTRIAL GLOVES CO.

712 Garfield Blvd. Danville, Ill.

Canada: Safety Supply Co., Toronto

EXHAUST UNITS

for Spray Booths and Hazardous Locations



Fan Sizes 12" to 27"

Free Delivery C. F. M. 900 to 12500

Immediate Deliveries from Stock.

Also Manufacturers of a complete line of waterwash and dry tape paint spray booths with accessories. *Send for details.*

M. & E. Manufacturing Co.

720 South Meridian Street

Indianapolis • Indiana

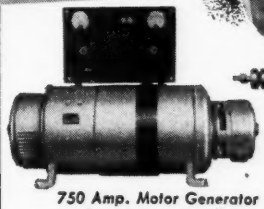
You'll Get Better Plating with MGC Electroplating Equipment

MGC Motor Generator Sets give you better plated surfaces and maximum economy in operation because—ball bearings guarantee maintenance of uniform air gap and good commutation, special windings assure positive voltage regulation, compact single unit construction gives longer life with less maintenance.

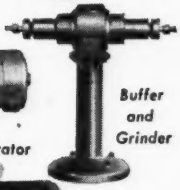
MGC Buffers and Grinders are especially adaptable for all plating work and will give dependable, trouble-free service. Give us your requirements. We'll give you details without obligation.

Motor Generator Corp., Box PF-46 Troy, Ohio

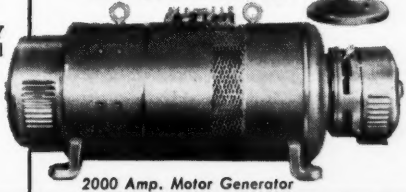
(Division of Hobart Brothers Co.)



750 Amp. Motor Generator



Buffer and Grinder



2000 Amp. Motor Generator

"One of the World's Largest Builders of Electric Generators"

by the Resinous Products & Chemical Co., 222 W. Washington Square, Philadelphia, Pa. According to the manufacturer, the resin produces metal finishes having maximum color retention and gloss coupled with unusual durability and resistance to alkalies and fruit acids.

Duraplex ND-77B is a non-drying, phthalic alkyd designed for use in conjunction with Uformite, urea formaldehyde resins, or nitrocellulose to produce fast-baking finishes at high temperatures. It is said to provide excellent pigment stability and good adhesion and to protect finishes against inadvertent overbaking. Duraplex ND-77B is soluble in aromatic hydrocarbons, hydrogenated solvents, chlorinated hydrocarbons, esters such as ethyl and butyl acetate, ketones such as acetone and methyl ethyl ketone, glycol ethers, and esters such as Cellosolve and Cellosolve acetate. Mineral thinner is tolerated by the resin in ratios as high as 3 parts thinner to 1 part resin in xylol solution, with alcohol tolerated in lesser amounts, the maximum ratio being equal parts of alcohol and resin solution.

Films containing Duraplex ND-77B in combination with Uformite or nitrocellulose call for a variety of baking schedules according to the formulation and the method of application.

M.S.A. Demand-Type Oxygen Mask

Mine Safety Appliances Co., Braddock, Thomas, and Meade Sts., Pittsburgh 8, Pa., announces the production of an oxygen mask for respiratory protection in unbreathable atmospheres. Designated as the M.S.A. Demand-Type Oxygen Mask, the product is a cylinder-type oxygen breathing apparatus which is said to feature simplicity and ease of operation combined with dependability.

Said to require no special training or practice for operation, the mask is available in two types, one of which includes an oxygen cylinder which is positioned on the wearer's back and supported by a comfortable adjustable harness. Sufficient oxygen is said to be supplied with this type for approximately one hour of normal breathing.

M.S.A. Demand-Type Oxygen Mask

The second type available is a front sling model with smaller cylinder for shorter periods. According to the manufacturer, both models provide oxygen exactly as needed by the individual wearer, this control being made possible by the demand regulator with which each mask is equipped. In addition, each mask is equipped with a pressure gage which indicates the amount of oxygen in the cylinder at all times. The breathing tube is quickly disconnectable for conservation of oxygen during stand-by periods. Fogging of the all-vision facepiece of the mask is said to be prevented by the provision of a flow of cool oxygen over the lenses.

J & J Engineering Company
Builders of
INDUSTRIAL FILTERS for Electroplating solutions, oils, solvents, water and alcohol.
SALT FOG TESTING EQUIPMENT to latest Gov't. Specs.
RUBBER LINED Tanks, valves and fittings.
Try the filter with the scientifically designed air wash method of cleaning.
J & J Engineering Company
1819 N. New England Ave., Chicago 35, Ill.

Quality Chemicals for over 50 years

PHELPS DODGE REFINING CORPORATION
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CHEMICALS
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COPPER SULPHATE
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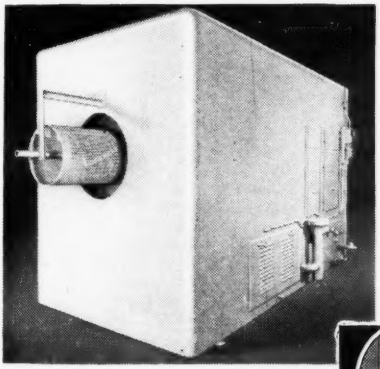
Clean Spray Booths

Spray BOOTHCOTE on clean booth.
Paint peels off in sheets.
NO SCRAPING—SAVE TIME and LABOR
Trial offer 5 gal. $5.50 F.O.B. Buffalo
Used by 2000 leading manufacturers.
MONEY BACK IF NOT PLEASED.
Write for Circular.
HYGRADE FOOD PRODUCTS CORP.
HARRIS SOAP—BOOTHCOTE DIV.
19 Stetson St., Buffalo 6, N. Y.

HOWARD Can Do IT



No. 343 New Howard End Loading Tumbling Mill for production tumbling of fragile or precision parts *without nicking!*

Don't let 'em tell you "it can't be done." For example, the machine at left is a typical Howard solution to an "IMPOSSIBLE" job . . . mass-production deburring WITHOUT NICKING! Howard Engineers specialize in the hard jobs—always come up with the right answer. Just tell us what your problem is.

WRITE FOR NEW CATALOG

Machinery for Pickling • Tumbling Deburring • Washing • Quenching Drying • Burnishing

HOWARD
HOWARD ENGINEERING & MANUFACTURING CO.
2237 BUCK STREET
CINCINNATI 14, OHIO

Aminco Automatic Electric Immersion Heater

The American Instrument Co., 8010 Georgia Ave., Silver Spring, Md., an-

Aminco Automatic Electric Immersion Heater

nounces the addition of an automatic electric safety immersion heater for liquids to its line of Aminco products. This heater with its automatic control, combined in one self-contained unit, is said to be ideal for installation in water tanks, drums, processing kettles, pipe lines, glue pots, etc., and once installed and set for the desired working temperature, the heater is claimed to function properly without further attention. The built-in safety control is arranged to limit the temperature rise of the heater and thus protect it against overheating and burning out should the liquid level fall and expose the heating element to air.

The Aminco Automatic Electric Immersion Heater can be easily and quickly fastened to the walls of a tank, drum, and so on, through a 1-inch pipe fitting or reducer, with only two wires required for connection from the current supply to the heater. Two or more heaters may be employed in one application and adjusted for step temperature control, or, where it is desirable to install more than one heater in the same vessel, the Aminco Immersion Heater can be used to regulate one or more non-automatic heaters through a relay. By merely turning an indicating screw, the heater can be set as desired from room temperature to 350 deg. F. From then on, the heater, it is claimed, will continue to maintain the temperature of liquids within plus or minus 5 deg. Fahrenheit.

According to the manufacturer, the sheath of the heater cannot become electrically energized, thus eliminating the danger of the material becoming electrically charged. A pilot light indicates when the heater is functioning.

The Aminco Automatic Electric Immersion Heater is available with copper sheaths for heating water or with steel sheaths for heating light oils, in wattage ratings of 250, 500, 750, and 1,000.

ALLWOOD

"Vienna Brand" Lime

Made from Limestone that is identical in chemical analysis and geological structure with European Imported Lime. Tests show a "lime cake" made from Allwood "Vienna Brand" Lime equals the finish made from imported lime.

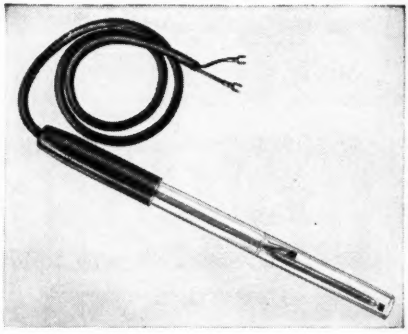
WRITE FOR FULL PARTICULARS

ALLWOOD LIME COMPANY

Manitowoc • Wisconsin

Industrial Type CEL-F Conductivity Cell

To meet the need for a conductivity cell that can be readily and safely immersed in a vat or tank and just as readily withdrawn after readings are taken, Industrial Instruments, Inc., 17 Pollock Ave., Jersey City 5, N. J., has brought out the Industrial Type CEL-F Conductivity Cell illustrated herewith. The cell comprises a heavy-walled industrial Pyrex glass wand with a hard rubber handle. The glass body measures approximately 1 inch outside diameter x 20 inches long. The electrodes are of platinized platinum.



Industrial Type CEL-F Conductivity Cell

To use, the wand is simply plunged into the liquid and the conductivity read off in any desired terms from a correspondingly calibrated solu-bridge or conductivity bridge. The cell is said to be especially convenient for checking the

FORM-A-ROC - W

A Perfected White Alkyd-amine Baking Enamel

Complete hiding power, great adhesion, remarkable flexibility coupled with high surface hardness.

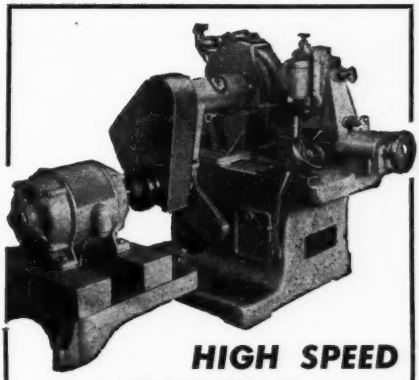
Baking schedules from one minute at 425 degrees F. to one hour at 150 degrees F. available.

Form-A-Roc formulation are also available in a wide range of colors and in a clear, tough, resistant topcoat.

●

The Varnish Products Co.

5206 Harvard Ave.
Cleveland, Ohio

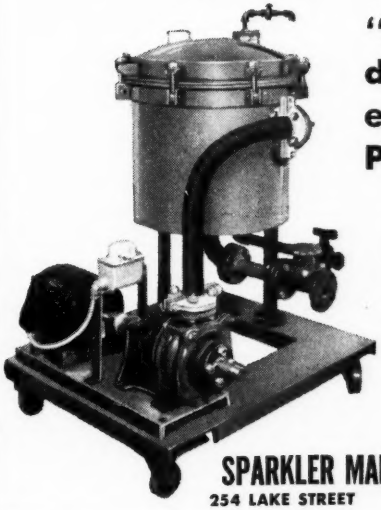


HIGH SPEED FINISHING

If you require Speed and Fast Feed surfacing for polishing outside diameter of tubing, rods, steel bars and other materials, you will find this PRODUCTION No. 101 polishing machine a real solution to your finishing problem.
No centering, no chucking, no holding. It can be operated with inexperienced labor.
Tandem machines for multiple finishing.

PRODUCTION MACHINE CO.
Greenfield **Mass.**

New, Improved Rubber Lined Filter



"Horizontal Plate" Design developed by SPARKLER especially for filtration of Plating Solutions . . .

If you are not now using Sparkler Filters, it will pay you to investigate the exceptional performance and stability of this new rubber-lined filter. It is designed to do a better job of reconditioning any and every kind of solution, enabling you to maintain highest quality, brilliancy and surface smoothness at all times.

Let a Sparkler engineer help you with your filtration problems.

Write for any special information.

SPARKLER HORIZONTAL PLATE FILTERS

SPARKLER MANUFACTURING CO.
254 LAKE STREET **MUNDELEIN, ILLINOIS**

strength of industrial solutions in tanks and vats, including pickling solutions. The cell is provided with heavy rubber-covered leads and is available in a wide range of cell constants. Although primarily intended as a dip cell, it can be conveniently clamped by suitable means and left in place.

BEX UT-30 Concentrated Washing Compound

Designed to meet aviation standards of safety, BEX UT-30 Concentrated Washing Compound now being marketed by the Gaybex Corp., P. O. Box 3, Nutley 10, N. J., is an amber liquid, which, extended with 10 to 500 parts of water, will safely and thoroughly clean any surface to which water may be applied, it is claimed. It is especially intended for industrial shop floors, engines, steam cleaners, walls, tile, office floors, desks, and so on.

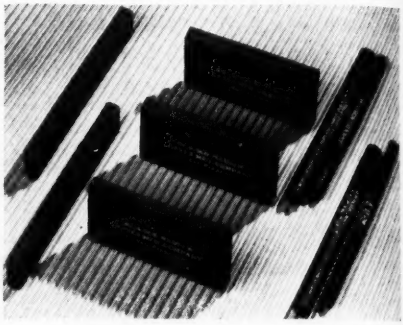
Odorless, BEX UT-30 Compound, according to the manufacturer, is chemically neutral and has no adverse effect on skin, cloth, metals, or plastics. On dilution with water, it forms a stable mixture. The compound weighs approximately 8¼ lb, per gallon and, if necessary, in exceptional cases, may be used in concentrated form without risk, it is stated. Exact dilutions for each particular use may be found by experimentation.

BEX UT-30 is available in 5 and 54-gallon (non-returnable) drums.

Cratex Abrasive and Polishing Blocks and Sticks

The Cratex Manufacturing Co., 81 Natoma St., San Francisco, Calif., announces the addition of abrasives and polishing blocks and sticks to its line of rubberized products.

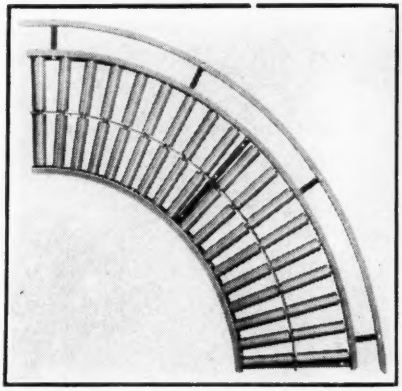
The blocks and sticks are specially designed for removing rust, slight blemishes, heat marks, tarnish, or stain, but can also be used to clean and polish molds and remove burrs from light castings.



Cratex Abrasive and Polishing Blocks and Sticks

Lyon Gravity Roller Conveyor

A "packaged" gravity roller conveyor for use in the handling and transportation of cartons, bales, packages, boxes, crates, and so on, is now being marketed



Lyon Gravity Roller Conveyor

WE RECOVER YOUR
SOLVENTS and THINNERS
from Sludge, Waste, Wash,
Spoiled Lacquers, etc.
AND SAVE YOU MONEY
Each shipment—one drum or a carload—receives PROPER and SEPARATE TREATMENT.
Solvents recovered by the Lefgren Process.
Write to:
SOLVENTS RECOVERY SERVICE, Inc.
1019 Broad St. or Newark, N. J.
HAMMOND CHEMICAL SERVICE, Inc.
241 Brunswick St. Hammond, Ind.

If its metal polishing or metal finishing you want, check LUPOMATIC.

DEBURRMASTER

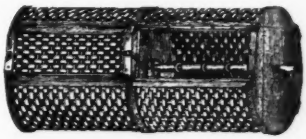
ASSURES TO MICROMETER DIMENSIONS

For efficiency in finishing metal parts, install a DEBURRMASTER.

Save time, money and produce assured results.

LUPOMATIC TUMBLING MACHINE CO., INC.
4510 BULLARD AVE. BRONX, N. Y.

Inexpensive, light in weight. Easy to install and operate.



King White-Oak Plating Barrel

becomes a sub-anode, thereby producing a cleaner, brighter plate. Less plating time is required to put on the desired thickness of plate.

Send for catalogue and specification sheets.

JOHN KING 48 SPRINGFIELD ST. DAYTON 3, OHIO

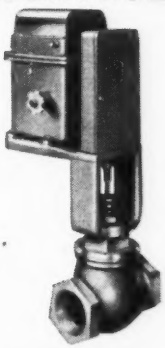
BARBER-COLMAN

MICRO SYSTEM *for* FINISHING CONTROL

REMOTE BULB MICROTHERM

Plating tanks, anodizing baths, and many other finishing operations where uniform temperature must be maintained, can be improved by using the Barber-Colman automatic electrically-operated "MICRO System" of temperature control equipment. Features include simple construction, no relays, and maximum power at all points of the valve stroke: "Hunting" is eliminated and the valve is positioned quickly with "micrometer accuracy."

Write for Bulletin
"CONTROLS FOR INDUSTRY"



PROPORTIONING VALVE

BARBER-COLMAN COMPANY
1248 ROCK ST. • ROCKFORD, ILL.

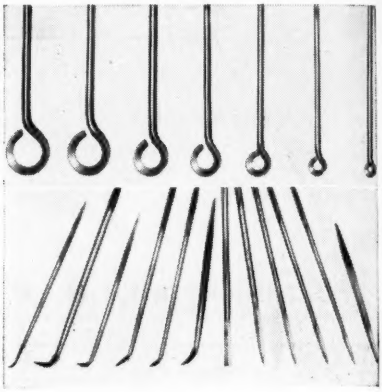
by Lyon Metal Products, Inc., Aurora, Ill. The conveyor is available in the following sizes: three straight sections, all 10 feet long and in three widths of 12, 18, and 24 inches; three 90-degree curved sections, 12, 18, and 24 inches wide; and two trestles, 18 and 24 inches inches wide. Each item is a complete unit.

Transportation on the Lyon Conveyor is by gravity—the rollers are not driven by power. The conveyor can also be employed in level sections for assemblying and packaging operations. A small retainer channel directly under the top flange of the frame rails covers the ends of the roller shafts and thus provides a safety feature. The rollers are mounted on full-length shafts so as to reduce the wear on the shafts and prevent spreading of the frame, especially under impact loads. By setting the rollers slightly above the level of the tops of the side rails, the conveyor can be made to accommodate packages that are wider than the conveyor section itself.

Metal Products Hand-Forged Deburring Tools

A unique line of hand-forged deburring tools is now being marketed by the Metal Products Co., South Bend 24, Ind. The line features seven distinct types, each in varying sizes, for a wide variety of hard-to-get-at deburring jobs.

A channel knife type included in the



Metal Products Hand-Forged Deburring Tools

line is supplied with a sharp or square point for removing burrs from long channels and holes in machined castings. For deep holes or across channels, 45 and 90-degree angle hooks are provided, as well as tools with radius-curved ends, in long or extra-long sizes. The Series "F" straight scraping tool is said to be useful for general scraping jobs but is prescribed particularly for removing exterior burrs on machined castings. A "button hook" shaped deburrer is available in seven graduations. The complete line is made of fine tool steel, with unimpeded operating shafts from 4¼ to 9 inches in length, and is hollow ground, hardened, and specially tempered.

Hand propelled, the Metal Products Deburring Tools are suitable for non-ferrous, hard metal work or plastics. The tools are available singly, unassembled, or in ready-made complete sets with non-splitting handles. They are said to be especially adaptable for work on deep slots, bottom surfaces, holes inside castings, recessed holes, top holes, and long channels.

Opportunity Section

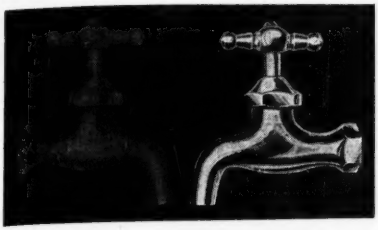
CHEMIST-SALESMAN.

Free to travel.
Write ONLY.

Sulphur Products Co.
Greensburg, Pa.
"See you—AES Convention—Pittsburgh—mid-June"

This Opportunity Section is available for classified advertisements featuring equipment, employment, business opportunities, etc., in the industries devoted to the cleaning, plating, polishing and finishing of metals. For advertising rates and other information address:

PRODUCTS FINISHING
431 MAIN STREET, CINCINNATI, OHIO



LUSTREBRIGHT

Bright Nickel Process

Produces Brilliant Adherent Nickel Deposits. Ideal Base for Chromium.

No color buffing • No re-cleaning • No re-racking • No special solutions. Merely add to cold nickel solution, still or mechanical • No extra equipment.

Guaranteed not to harm Nickel Solutions

Illustration shows unbuffed deposits before and after Lustrebright.

Write for complete information.

W. C. BRATE COMPANY

Established 1860

16 MARKET ST. ALBANY, N. Y.

34th National Convention of AMERICAN ELECTROPLATERS' SOCIETY

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June 17 - 20

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HOTEL WILLIAM PENN
Pittsburgh, Pa.

•

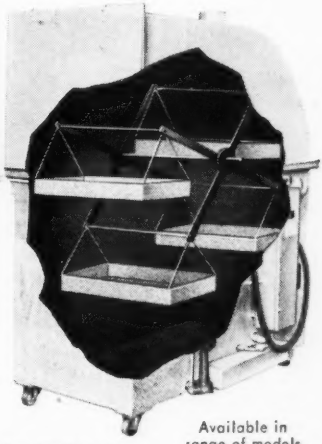
Plan now to attend the Educational Sessions of the first post-war convention. Many new subjects will be discussed, including Strip Plating, Organic Finishes, and Activities of the Research Committee. The latter will include: tank linings, corrosion resistant equipment, rack coatings and similar materials.

CLEAN 60% FASTER

with Phillips *ROTOMATIC* VAPOR DEGREASER

- Cleans thoroughly and economically with Phillsolv non-flammable solvent.
- Lowest Toxicity.
- Completely automatic timer and limit switch governs cycle of cleaning.
- No shut-downs to distill solvent.
- Completely hooded, with exhaust stack and hanging door.
- Automatic safety features.
- Equipped with flusher pump and hose.

RECLAIMS ITS OWN SOLVENT WHILE OPERATING



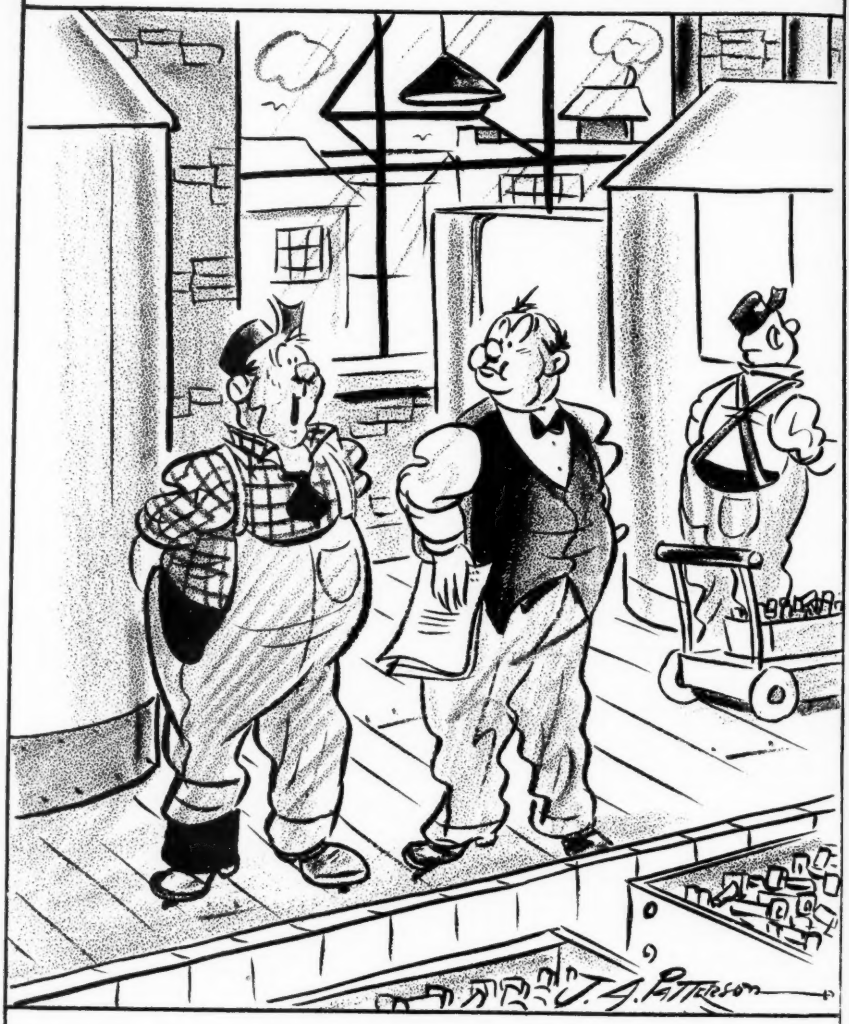
Available in range of models and capacities up to 3,000 pounds of work per hour. Write for complete details.

Manufacturers of a Complete Line of Metal Cleaning Machinery

PHILLIPS MANUFACTURING CO.

3440 W. TOUHY AVENUE • CHICAGO, ILLINOIS

The Finishing Touch **By J. A. Patterson**



"I'm new here—Whom do you see about getting a raise?"